

















**Vol. 13 No. 1**  
**Jan.-March 1990**

# **food** **DIGEST**



**Central Food Technological  
Research Institute, Mysore,  
CSIR, India.**



**National Information System  
for Science and Technology  
Department of Scientific and  
Industrial Research, New Delhi**



## SDI SERVICES FROM NICFOS

A few years back a survey was conducted among users of our services regarding their option for the selective dissemination of information (SDI) in the area of Food Science and Technology. The survey indicated a need for the above type of service. Recently we have started this new service with the installation of computer facility at our centre.

In SDI service we are supplying specific information needed by the users on the relevant topic of their interest based on keywords supplied by them. The SDI service is provided by searching the current tapes of the FSTA database produced by the International Food Information Service. The relevant abstracts obtained based on the profile through the computer printout will be mailed regularly. There is also scope for to alter the profile consequent to the receipt of our printout knowing the relevance or otherwise of the abstracts supplied. We are sending the printouts on trial basis for two months. If you find this service useful you can start subscription for regular SDI service.

We request you to send your profile in the prescribed form available with us

For profile form, please contact: *The Area Co-ordinator*  
*FOSTIS, CFTRI*  
*MYSORE - 570 013, India.*

## FOR PHOTOCOPY (XEROX) OF PUBLISHED SCIENTIFIC/TECHNICAL ARTICLES PLEASE CONTACT US

The National Information Centre for Food Science and Technology (NICFOS) at the Central Food Technological Research Institute, Mysore, has got a good collection of scientific and other periodicals collected over the years in the area of Biological Sciences. If any article is needed for reference work, we will supply one copy from our wealth of collections. The cost of providing the copies is Rs.2/- per page (minimum charge Rs.10.00). Please take advantage of this facility to overcome your problem in getting original articles.

Please contact : *The Area Co-ordinator*  
*Food Science and Technology Information Service*  
*C.F.T.R.I., Mysore 570 013, India.*



# **FOOD DIGEST**

**Vol.13 No.1**  
**Jan.-March 1990**

**National Information Centre for Food Science and Technology**  
**Central Food Technological Research Institute,**



POODU BUREAU

VOL. 10, No. 1  
Jan-March 1981

Annual Subscription: Rs. 150.00, US \$ 65.00, Single copy: Rs.40.



## CONTENTS

1.	Raw Materials	...	-
2.	Storage and Infestation Control	...	1
✓ 3.	Food Additives	...	-
✓ 4.	Processes	...	-
5.	Byproducts and Waste Utilization	...	3
✓ 6.	Processed Products	...	-
✓ 7.	Equipment and Machinery	...	5
✓ 8.	Packaging	...	20
9.	Analysis	...	21
10.	Commercial Intelligence	...	22
11.	Food Regulation, Quality Control and Hygiene	...	32
✓ 12.	Transfer of Technology and New Industries	...	40
13.	Personalia	...	-
14.	Special Article - Flexible Packaging of Heat Processed and Frozen Foods	...	41

Index







## Raw Materials

Nil.

## Storage and Infestation Control

### 1 Cool storage for fruits and vegetables

One effective method of preserving fresh produce after harvest is maintaining low temperature and high humidity. Mechanical refrigeration requires a high input of energy and is expensive. So it is necessary to devise means by which the storage temperature can be reduced without using too much energy.

Based on the principle of evaporative cooling zero energy cool chambers have been developed for short term storage of fruits and vegetables. The raw materials required for construction are brick river-bed sand bamboo khaskhas gunny bags etc. Water can be drawn from taps tubewells, handpumps or ponds.

The floor of the storage space is made with a single layer of bricks. The side walls are built with a double layer leaving a space of three inches between the bricks which is filled with river bed sand. The top cover of the storage space is made with khaskhas/gunny bags in a bamboo structure. It requires 400 bricks and 10 bags of riverbed sand to hold about a quintal of fruits and vegetables.

#### Complete wetting

After construction, the bricks sand and top cover of the cool chamber are wetted (saturated) by sprinkling water. Actual storage of fruits and vegetables should be undertaken only when the cool chambers are completely wet. Once this is done sprinkling water once in the morning and evening is enough to maintain the temperature and humidity.

An interesting feature of the cool chamber is that the fluctuation of maximum and minimum temperature inside is not much (about 2.3 C) compared to the outside and more so in summer. The relative humidity of the chamber is maintained above 90 per cent throughout the year even when maximum humidity outside falls alarmingly.



Storage life of fruits and vegetables increases when they are kept in the cool chamber immediately after harvest. Ber, mango, grapes, sapota, sweet orange and vegetables such as palak, methi, lettuce, okra, cauliflower, peas, beetroot, carrot and cucumber can be retained for a reasonable duration compared to ambient conditions before they are sent to the local markets.

(The Hindu 27 December 1989, 24)

## 2 All purpose food storage bag

Food in the zippered Microfreeze Bag can be frozen, refrigerated, boiled and microwaved according to its manufacturer. Consisting of three co-extruded layers of tough, temperature resistant polyethylene and nylon, it is said to offer excellent barrier properties. Featuring a patented shape, this multipurpose bag can stand up for easy stacking and filling.

For further information write to: Vinmar Impex, Inc. 15600 Drummet Blvd. Ste 570 Houston, Texas 77032 U.S.A.  
(Industrial Products Finder 18(4), 1990, 95)

## 3 Fully insulated chiller for fresh vegetables

Versatile and fully insulated, the Arctic Rain Hydrochiller can be custom designed for each specific cooling need of vegetable packing and processing operations. Built to save energy, the combination water chiller and hydrocooler rapidly removes field heat from vegetables. This ability reduces the respiration rate and greatly prolongs shipping life and quality of vegetables.

For more details write to: Semco Manufacturing Co. P.O. Box H, Pharr, Texas 78577 U.S.A.  
(Chemical Products Finder 8(7), 1989, 149)

## 4 Yeast coating of vegetable and fruits

Scientists at Israel's Agricultural Research Organization (ARO) near Tel Aviv have isolated a form of natural yeast that occurs in nature on the skin of citrus fruit, protecting it against fungi. The yeast has already been produced in large quantities, patented and successfully applied to a consignment of tomatoes and cucumbers exported to Europe.

Israeli experiments show that 96% of produce stays fresh after treatment with this yeast, reports Dr. Edo Chalutz of the ARO Institute for Technology and Storage of Agricultural Products. The yeast does not affect taste and as it occurs in large quantities in certain cheeses.



Dr. Chalutz envisages a situation whereby a dipping coating process is built into all fruit and vegetables packing stations. Israel also hopes to sell laboratory made yeast to farmers in Africa and America who export their fresh winter produce to Europe.  
(Chemical Weekly 35(18), 1990, 82)

## 5 Natural scent used to trap insects

Pheromones a natural sexual scent and a patented controlled-release membrane are combined in the Biolure Insect Trap to manage insects. This nontoxic method safely keeps a wide variety of insects including gypsy moths and fruit flies from infesting row crops orchards and stored food in warehouses. Long lasting and economical this trap can be used in areas with infestations in order to reduce overall spraying.

For further information write to: Consep Membranes Inc 213 SW Columbia St. Bend Oregon 97702 U.S.A.  
(Industrial Products Finder 18(2) 1989, 44)

## Food Additives

Nil.

## Processes

Nil.

## Byproducts and Waste Utilization

## 6 Alcohol from damaged grains

Punjab will have the country's first high quality alcohol plant by 1991 based on damaged foodgrains reports PTI. The project which will be completed by March 1991 will provide direct employment to about 300 persons and indirect employment to about 5,000 persons in Punjab.

The State Financial Commissioner Development Mr. A.S. Pooni said that about 50,000 tonnes of damaged foodgrain was available in the state per annum. Mr. Vijay Mallia Chairman of the private company assisting the Punjab Agro Industries in setting up the plant claimed that the new distillery would be producing the finest quality of alcohol spirit comparable in quality with the best available in the world.  
(Chemical Weekly 35(14), 1989, 56)



## 7 Edible oil from fungi

Researchers at the Defence Food Research Laboratory (DFRL) in Mysore, Karnataka, have identified a species of fungi as a potential source of edible oil. The oil synthesised by the fungus, *Fusarium pallidoroseum*, resembles olive oil in its chemical composition.

The DFRL researchers have screened nearly 20 species of fungi over the past two years in a programme to look for microorganisms as an alternative to seeds in the production of fats and oils.

Under optimum conditions, the oil yield from *Fusarium pallidoroseum* is nearly 38 per cent, which compares very well with the oil output from various oil-producing seeds. The oil available from groundnut is about 45 per cent, while the oil palm, the coconut and the soyabean each have yields less than 20 per cent of the seed mass.

The DFRL team led by Director Dr.R.Sankaran has also developed a rapid and simple staining technique to detect the onset, accumulation and termination of oil synthesis in the fungal mycelium.

The measurements done through this technique are as accurate as those done through conventional gravimetric measurements. But while gravimetric measurements take 12 hours and involve harvesting, drying and extraction of the fungal mycelium, the new colorimetric test takes only about 30 minutes.

(Chemical Weekly 35(15), 1989, 87)

## 8 Caffeine from Tea Waste

The Regional Research Laboratory, Jorhat has developed a process for extraction of caffeine from tea waste. The waste is cleaned and boiled with lime liquor bringing the caffeine in aqueous phase. Filtrate is then extracted counter currently with benzene and the extract is evaporated to recover benzene for reuse. Caffeine thus obtained is dissolved in water and subjected to crystallisation to get pure caffeine. The yield is about 1.5 - 2% by weight of the tea leaves. The decaffeinated tea can be processed to produce boards and other products. Conventional machinery used for solvent extraction of oilseeds can be adapted with slight modifications for continuous extraction of caffeine by this process.

(Documentation Bulletin 77, 1989, 17)

## 9 Turning potato waste into biodegradable plastics

A process that biologically converts food processing wastes into lactic acid, then uses the lactic acid to make environmentally safe bio- and photo-degradable plastics has been developed by the Argonne National Laboratories.

According to the journal "Chemical Engineering", starch (from sources such as potato waste or cheese whey) is enzymatically hydrolysed to glucose. The glucose and other hydrolysis products are



subsequently fermented by bacteria that produce lactic acid which is continuously recovered, concentrated and further purified into a polymer-grade product.

In a related development, scientists at the Japanese Government Industrial Research Institute at Shikoku have just developed a new biodegradable plastic sheet made from a combination of polysaccharides - mainly cellulose derivatives and chitinous substances, the journal said.

The scientists make the material by diluting homogenised cellulose to form an aqueous suspension, and dissolving chitosan in a one percent acetic acid aqueous solution.

After sufficient mixing, and degassing under reduced pressure to remove trapped air bubbles, this solution is put into a dish, then dried for 15 h at 70 C in a forced-convection oven. The resulting translucent sheet is approximately 60-80 micro metres thick and contains 320 mg of cellulose, it said.

In tests, a corn seed was planted in a pot of this sheet material, and the pot was partially buried in soil. After 75 days that portion of the pot that was in the soil had decomposed completely allowing the roots of the corn plant to extend freely. (P.T.I. Science Service 9(1) 1990. 14)

## Processed Products

-Nil-

## Equipment and Machinery

### 10 Programmable liquid filling system

Described as accurate yet low-cost, the EF-100 Series Liquid Filler fills containers of all shapes and sizes. Its features include a programmable microprocessor control, compact design, and easy operation and cleaning. The instrument can fill any flowable liquid from millilitres to gallons with an accuracy to  $\pm 0.5\%$  or better. Various available options allow users in food, chemical, packaging, and cosmetic industries to customise the filler to specific requirements.

For further information write to: Adtech, Inc P.O. Box 135, Rte 113 and Mensch Rd, Skippack, Pennsylvania 19474, U.S.A. (Industrial Products Finder Annual 1989, 125)



## 11 Rotary powder filling machines

Autopack England offers semi-automatic and automatic rotary powder filling machines having filling speeds of 25 to 100 fills/minute. These machines can handle powder products like milk powder salts spices talcum powder and other free flowing and non-free flowing powder products. Autopack also offers semiautomatic and automatic liquid filling lines from 100 cc to 200 litres; and multi head selective weigher for frozen foods vegetables confectionery dry foods snacks nuts, biscuits etc. Product is filled by weight with the help of microprocessor based control systems. Linear weighing machines are also offered with vibratory feeders.

For more details write to: Panpack Marketing, Panchal House, P.B. No.48, Station Road, Anand, Gujarat 388 001.  
(Chemical Products Finder 8(7), 1989, 131)

## 12 Machines seals round containers

The Dixie Double Seamer closes round tin, aluminium, composite, and plastic containers up to 15.9 cm in diameter. Available in atmospheric, vacuum or gassing models, this machine seals lightweight metal tops at a rate of 2-8/min. It comes in a table version or a floor unit to meet the individual needs of food and beverage processors and low-volume packagers.

For more details write to: Dixie Canner Equipment Co., P.O. Box 1348, Athens, Georgia 30606-1348, U.S.A.  
(Chemical Products Finder 8(7), 1989, 149)

## 13 Form-fill-seal machine

The latest technological breakthrough achieved by Nichrome is the development of the electronic weigh-filler. The Weighmaster specially designed for such situations of dynamic weighing, is capable of handling upto 20 weight fills per minute and is compatible with form-fill-seal technology. This highly sensitive electromagnet-ic system is designed to give up to 0.01% fill accuracy. Thus in the case of high value items such as cashewnuts, for example, where compounded losses due to filling inaccuracies can be considerable the Weighmaster is a very useful and cost-effective piece equipment. In the case of high value products such as engine oils, perfumes and expensive foodstuffs where inaccuracy on either side can result in serious losses to the supplier or to the consumer, Nichrome's checkweighing device can be of great value. Here every package is weighed for accuracy and defectives are sorted out. The device can be interfaced with a real-time computer which can generate day-to-day productivity records. The checkweigher can also be used as a tare weight calibration system when linked to a weigh-filler through a feedback loop. Automated container filling lines find use in certain specific areas of application such as foodstuffs hazardous materials and high-value products where precision performance is a must and the incidence of human error has to be minimised.



For more details write to: Nichrome Metal Works, 46 Dr. Ambedkar Road Near Sangam Bridge Pune Maharashtra 411 001.  
(Chemical Products Finder 8(7), 1989, 34)

#### 14 Food weighing and packaging system

Manufactured by Ross Industries Inc. USA the rugged sanitary stainless steel multiple-selective, combination Weighing and Packaging System automatically packages pasta vegetables meat candy and other foods. The weigher deposits exact proportions into the bagger's form tooling, so bags are made only when needed. A powerful IBM compatible computer makes the system adapt to variations in upstream production and product flow. It also controls excessive give-away overfilled scales and forced dumps.

For further information write to: Ross Industries, Inc Rte 610 Midland, Virginia 22728, U.S.A.  
(Industrial Products Finder Annual 1989, 253)

#### 15 Strip packing machine

Acufil Model 2TR Strip Packing Machine is best suited for packing of supari, peppermint, and tablets in heat sealable laminates. It has an operating speed of 270 to 300 pouches per minute in one gram range. This machine is of proven design and functions without any fault. The sealing temperature is controlled electronically totally eliminating paper wastage. The power requirement is 1 HP and 1,000 watts. Acufil also manufactures automatic, conveyor operated hot air sachet sealing machines, and powder filling machines.

For further information write to: Acufil Machines 23 V N Industrial Estate, Peelamedu, Coimbatore, Tamil Nadu 641 004.  
(Industrial Products Finder 18(4), 1990, 163)

#### 16 Tray driers

Melco offers 12, 24, 48 and 96-tray driers for use in chemical, pharmaceutical, dyestuff, food, confectionery, sericulture, and baking ovens for powder/Tuflon coating. Standard temperature ranges are 100 C, 200 C and 300 C. The external frame is made of 10 guage fabricated MS angles. The external cabinet and internal work chamber is covered with heavy guage CRCA sheets. A resin bonded good quality fibre-glass slab type insulation is provided between the external and internal walls. The insulation thickness varies from 50 to 75 mm depending upon the working temperature. Well balanced propeller type fans driven by motors manufactured by reputed companies with ISI mark are provided. Suitable filtered inlet and adjustable roof mounted exhaust ports are provided. Stainless steel U type sealed air heaters with ISI mark are provided for rapid heating and trouble free long life. A control panel complete with solid state digital indicating temperature controller, rotary main switch, separate HRC fuses for motor and heater circuits, overload relays with single phasing



preventer and indicating lamps are provided. A remote control panel for corrosive and hazardous atmosphere, trollies, trays and temperature recorders are optionally provided.

For more details write to: Moktall Electrical Co, C/G-8 Ram Girdhar Industrial Estate, Station Road, Vithalwadi, Dist Thane, Maharashtra 421 003.

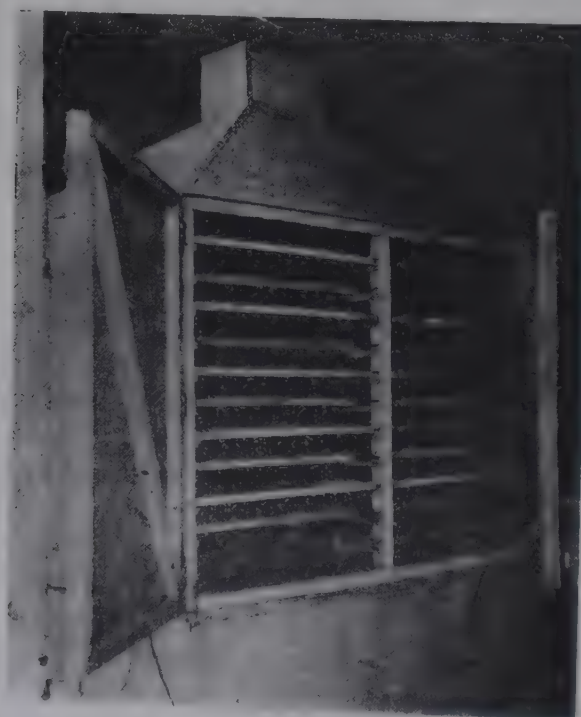
(Chemical Products Finder 8(7), 1989, 184)

## 17 Low-cost tray dryer for food products

The tray dryer (Figs 1 & 2) basically consists of a drying chamber and a plenum chamber. The frame of the plenum chamber is made of MS angle and flats and is covered with asbestos sheet on the sides and wire-mesh at the top. A burning-cum-heat exchanging unit is housed in the centre of the plenum chamber. The burning chamber is a GI sheet cylinder fitted with 6 pins for heat transfer. One end of the cylinder is open to take in fuel which is burnt in the centre, and other end is connected to a chimney having a butterfly valve for manual control of drying air temperature.

The drying chamber is made of soft-wood frame and plywood cover housing 20 wire-mesh trays of 90 x 120 cm size. An exhaust vent with adjustable opening is provided at the top.

*Fig. 1. The low-cost natural convection type tray dryer for food products.*



### Operation

The fuel (dry agricultural waste wood chips etc) is burnt in a welded wire-mesh tray in the centre of the burning chamber. Due to high temperature of flue gases, the drum and the fins get heated. This heat is transferred to surrounding air by radiation and convec-



tion. The hot air comes in contact with the wet material as it moves upward. The moisture laden air then escapes from the exhaust vent. This process creates a cycle of natural convection of air through the drying trays. The material is stirred frequently and position of the trays is interchanged to achieve uniform drying.

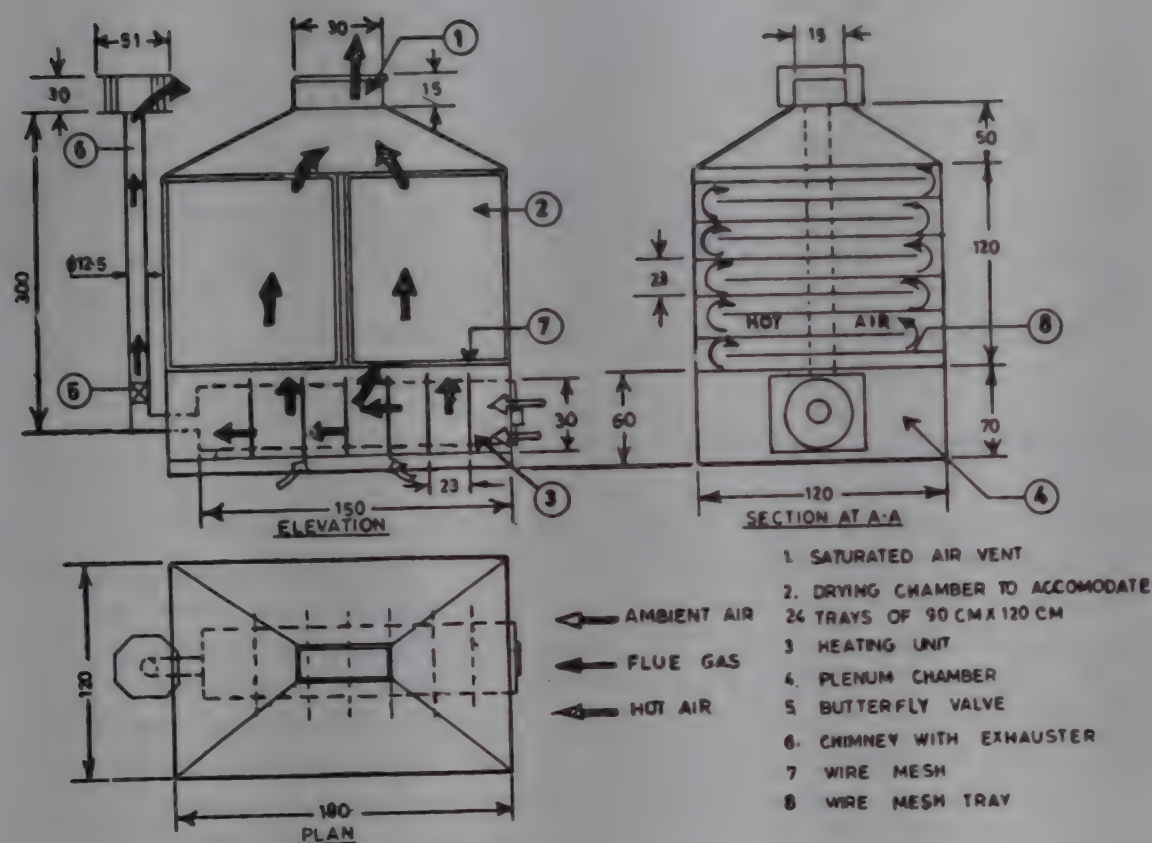


Fig. 2. Natural convection type tray dryer for soybean.

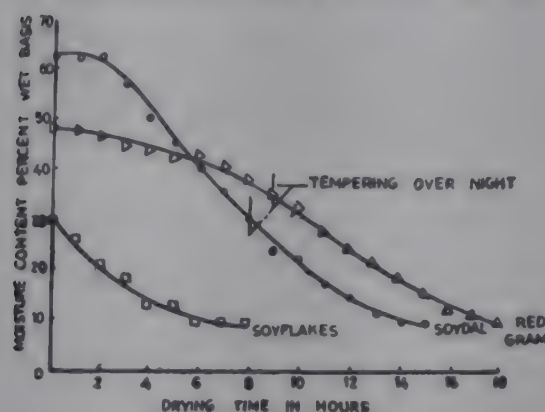
## Performance

The dryer takes a load of 100 kg of wet material per batch. Its fuel requirement is about 3 kg wood-chips/hr to maintain no-load temperature of about 50 C.

Blanched soyabean and soaked redgram were dried in this dryer. The time required for drying redgram (49% to 9.4% mc), soydal (63% to 8% mc) and soyflakes (30% to 10%) was 18, 15 and 6 hours respectively. The variation of moisture content with time for the above products is shown in Fig. 3.



Fig. 3. Variation of moisture content with time for redgram, soyflakes and soydal in tray dryer.



The dryer is estimated to cost Rs. 5,700. The cost of drying works out to Re.0.25/kg, which compares well with sun-drying, not to mention drastic reduction in processing time and improved material quality. Being simple in construction it can be easily fabricated in a rural workshop by local artisans. And since it uses agricultural waste as fuel it is independent of weather and electrical power. (Invention Intelligence December 1989, 567-8)

## 18 Low temperature drying systems

For products which are temperature sensitive drying at high temperature deteriorates their quality. In such instances the solution lies in surrounding the products with dry air without the risk of product spoilage. Dry-Air specialises in such types of systems for drying at temperature below 75 F. These dehumidifiers speed up product drying by continuously removing moisture from the surrounding air by a process of physical adsorption where the adsorbent used is a desiccant. The units are custom designed for specific requirements. They are available in different models with different drying capacities. Dry-Air dehumidifiers find applications in various industries where low temperature drying is required like drying of cocoa gelatine yeast coffee powder flour, starches katha onions in processing powdery foods like soft drink concentrates milk powder, sugar in packaging and storage of biscuits wafers snacks and in breweries and distilleries to prevent mould and mildew formation in hop storages yeast rooms, fermentation and kegging areas.

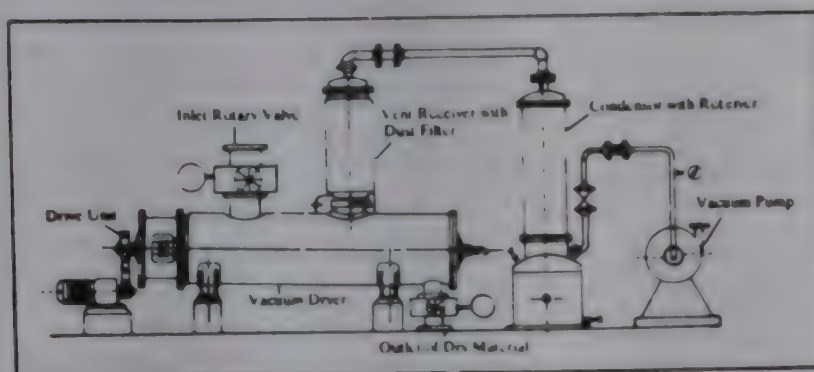
For further information write to: Arctic India Sales 20 Rajpur Road Delhi 110 054.  
(Industrial Products Finder Annual 1989, 413)

## 19 Continuous vacuum dryer

Atomic Vacuum Company designs and manufactures horizontal agitated vacuum dryers suitable for continuous process. As a better alternative to conventional batch type dryers this new dryer can take feed continuously from atmospheric pressure to vacuum and effect continuous delivery of dried products from vacuum to atmosphere. Other features include: advanced design of the dryer low temperature drying to suit heat sensitive products blade design can be varied to



suit the characteristics of products handled, more compact than batch type dryers, and ideal for mass production at a comparatively limited space and time. Nominal capacities offered are from 5 kg/hr up to 1,000 kg/hr. This equipment is also suitable as a continuous reactor-cum-dryer.



For more details write to: Atomic Vacuum Company, 39/467 Shell Colony, Chembur, Bombay - 400 071.  
(Chemical Products Finder 8(6), 1989, 137)

## 20 Double-cone vacuum driers

Mech-Tech manufactures Double-cone vacuum driers for fast and efficient drying of a wide range of chemical, pharmaceutical and food products. The double-conical vessel with an external jacket for heating ensures direct contact between the material and heated surface. The vessel rotates on its axis resulting in tumbling action of the product inside. This constant movement of the product increases the heat transfer between the heated surface and the product. A high vacuum is maintained throughout the drying process to facilitate full recovery of solvent vapours. Salient features are: uniform temperature throughout the batch eliminates caking totally sealed and protected from dust and contamination; quick loading and unloading and low temperature drying retains product characteristics. The driers are available in capacities ranging from 250 to 2,500 litres.

For further information write to: Mech-Tech PB No. 9019, SCB Complex WE Highway Goregaon (E) Bombay-400 063.  
(Industrial Products Finder 18(4) 1990, 185)

## 21 Sweet making equipment

Navayug Industrials offers equipment for making sweets. It consists of a hemispherical vessel rotating at a speed of 15 to 20 RPM. The vessel is provided with fixed or oscillating scrapers. Heating is by a direct flame. A variety of stirrers like petal stirrers and high speed stirrers are offered. These stirrers are used for mixing homogenising and kneading. Material of construction of the vessel is SS 304/SS 316. The vessel is available in sizes from 100 litres to 10,000 litres.

For further information write to: Navayug Industrials, 23 Govt Industrial Estate Kandivli (W), Bombay 400 067.  
(Industrial Products Finder 18(2), 1989, 15)



## Heavy duty kneading machine

FE manufactures heavy duty Sigma Kneading Machine which is specially designed for mixing masticating breaking down dispersing wetting down and homogenising viscous materials of the strongest consistency used in the chemical dyestuff food paint and adhesives industries. The kneading blades are casted in one piece, and is of duplex type so as to avoid any dead spots which on other blade types accumulate unwetted solids and cause non-uniformity of product. Both blades rotate in opposite direction towards one another and in different speeds having ratio 1:2 or any ratio that the user requires so as to ensure intensive lifting and homogenising of the material. Heavy stuffing boxes are provided with roller bearings phosphor bronze bushing and Teflon impregnated seals to ensure smooth working and longer life of machine. The entire container can be tilted from horizontal to vertical position up to an angle of  $110^\circ$  manually electrically, or hydraulically as desired. Bottom discharge can also be provided to facilitate quick discharge.

For more details write to: Frigmaires Engineers Bharat House  
2nd Floor 104 Bombay Samachar Marg Fort Bombay 400 023.  
(Chemical Products Finder 8(7) 1989 161)

## Improved dough mixer

The Central Institute of Agricultural Engineering Bhopal has come up with an improved electrical dough mixer that can make homogenous dough in far less time than current mixers.

The new dough mixer is a simple structure that can be fabricated locally and is of use to small-scale baking units. It consists of a vertical angle iron frame with a single steel arm. The arm rotates in a stationary steel cylinder with the help of an eccentric disc. A gear box attached to the main shaft on the top of the machine has ordinary and level gears of different sizes. The gear system is enclosed by a metallic cover to avoid contamination by lubricants or any other unwanted material in the final product.

A two-horse-power electric motor, which is connected to the main shaft through a belt and pulley, generates a vertical motion which is converted into horizontal motion by the level gear and transmitted to the steel arm through the eccentric disc.

The two-way motion developed by the rotating steel arm which rotates both along its own axis and that of the central shaft with the help of the eccentric disc, helps in homogenous mixing of the dough.

The machine can mix three kg of flour in three minutes at an arm speed of 600 rounds per minute. The single arm power-operated dough mixer is 1000 mm long 840 wide and 519 mm high and weighs 66.5 kg with the electric motor. says a report in the Indian Journal of Agricultural Science  
(P.T.I. Science Service 9(1) 1990, 5)



## Double arm mixer-cum kneader

The Fabdecon double arm mixer-cum-kneader is a highly engineered machine used for mixing and kneading high viscous and pasty material. It is available in capacities ranging from 10 to 2,000 litres. The mixing action is a combination of bulk movement, smearing, stretching, folding, dividing and recombining as the material is pulled and squeezed against blades and walls of the container. The mixer has wide applications in diverse industries like confectionery (bread, biscuit, chewing-gum, chocolates) etc. The mixer is available in mild steel, stainless steels of all grades, alloy steels, Hastelloy and abrasion-resistant materials of construction. To enhance scope, options offered include vacuum design, jacketed trough for heating or cooling, variable speed drives and different blade designs. The mixer incorporates efficient sealing system to avoid extraneous material like bearing lubricants, etc from leaking into the mixing zone. Also special seals can be provided for high vacuum application and for abrasive material mixing. Discharging of material is effected by tilting the container manually, mechanically or hydraulically, or through bottom valve, operated manually/pneumatically; or through an integrally incorporated extruder. Fabdecon offers right combination of features to provide a mixer suited to individual application and also incorporate electrical and mechanical interlocks to ensure accident-free operation.

For more details write to: Fabdecon Engineers 138 Damji Shamji Industrial Complex, Off Mahakali Caves Road, Andheri (East) Bombay 400 093.  
(Chemical Products Finder 8(7) 1989, 161)

## 25 Sigma mixer (kneader)

PEC offers a heavy duty, double arm mixer (kneader) designed for uniform mixing and kneading heavy viscosity materials such as stiff pastes, different kinds of dough, adhesive polyester premixes, flush colours and brake lining compounds. The tangential action of mixing and kneading is thoroughly obtained by Z shaped spiral kneading blades having very close clearance to the vessel walls, thus the kneading material does not stick to the inner walls of trough. Blade is manufactured from graded cast steel/stainless steel. Container tilting can be manual or motorised and, if desired, discharge facility at the bottom can be provided. The mixing trough can be jacketed and hydraulically tested for heating and cooling purpose. Vacuum facilities can also be provided. User areas include chemical, pharmaceutical, confectionery, food products, paapad dough. The machines are available in working capacities ranging from 4.5 to 1,200 litres, in mild or stainless steel construction.

For further information write to: Paresh Engineering Co., 74-B, Sanjay Building No.5, Mittal Industrial Estate, M Vasanji Road, Marol Naka, Andheri (E), Bombay 400 059.  
(Industrial Products Finder 18(4), 1990, 24)



## 26 Grinder processes grains and cassava

Farmers and food processors can grind all types of grain and cassava for both human and animal food with the portable Adeem 500 grinder. Made of stainless steel plate, it has interchangeable screens. Capable of processing 250-1,000 kg/h, this fuel efficient, easy to operate machine can be powered by electricity or gas.

For further information write to: Adeemera Enterprises, Inc., P.O. Box 266, 82, Oakbrier Ct, Penfield, New York 14526, U.S.A. (Industrial Products Finder Annual 1989, 85)

## 27 Quick freezing for food processing plants

Described as easy to operate, the RECO Vertical Plate Freezer Model VPF allows rapid loading, freezing, and unloading of fish, offal, vegetables, fruits, and ground meat. The equipment is generally used for products to be further processed later. The vertical aluminium plate freezing process is said to provide excellent heat transfer and low cost quick freezing of blocks of product for containerisation and palletization. Unlike material frozen in cartons, the uniformly thick and flat blocks can be stacked securely.

For further information write to: Refrigeration Engineering Corporation, 5680 E Houston St., San Antonio, Texas 78220, U.S.A. (Industrial Products Finder Annual 1989, 523)

## 28 Fruit mill (fruit shredder)

The Temp-X multi-purpose machine is suitable for fruit, dairy and food industries. It can be used for grape cutting in beverage industries; tomato shredding for sauce chatni plants; guava cutting for pulp making; onion shredding for chatni preparation; casein grinding and shredding either wet or dry in dairy industry; dry fruit cutting to standard pieces in ice-cream plant; and groundnut shredding to fluffy mass for making sweets. With flexible attachment it is possible to shred coconut, potato, cashew nuts, cake and the like. It is also used for mixing dry powder to cereals and tea ingredients. The machine is portable, motorised 1HP x 900 RPM, mounted on a table. It has top-feed and bottom-discharge chutes. Parts coming in contact are from SS 304.

For more details write to: Shriram Temp-X-Changers (India) 991/2/A, GIDC Opp Makarpura Bus Depot, Vadodara, Gujarat 390 010. (Chemical Products Finder 8(6), 1989, 138)

## 29 Automatic internal lacquering machine for food and beverage cans

The Automatic Spraying Machine HIL-15 developed by Sprimag Spritzmaschinenbau GmbH of West Germany internally coats up to 1,000 beverage cans per minute with a uniform and pore-free layer of protective lacquer. The machine works continuously at a constant pace



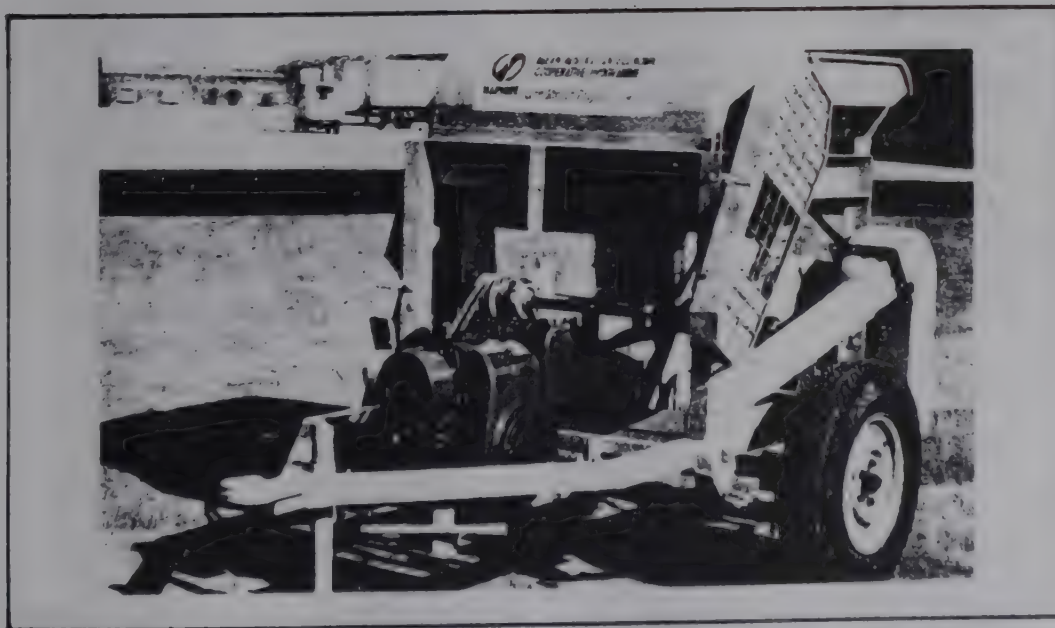
ensuring gentle and damage-free handling of food and beverage cans. The HIL-15 sprays through 6 rotating but stationary airless hot spray units in constant spraying position, each with 2 to 3 guns spraying simultaneously with minimum back pressure. The cans are rotated while spraying for uniform coating thickness. Lacquer is kept in circulation in the spray units to prevent premature jet clogging. Lacquer overspray is drawn off and filtered dry. Filters can be exchanged even during operation. The HIL-15 is usually equipped with a drying furnace and thermal waste air cleaning as well as a cooling zone and if necessary conveyerisation up to a storage point. It can also be used for modern environment-friendly water-based lacquers. The machine can be imported against Actual User's Import Licence.

For more details write to: Industrial Plants and Equipment Co.  
434 Hind Rajasthan Bldg, D. Phalke Road, Dadar, Bombay 400 014.  
(Chemical Products Finder 8(6), 1989, 136)

### Improved mobile corn sheller

In response to the need to reduce shelling losses due to technical deficiencies an improved mobile corn sheller has just been developed by the National Post-Harvest Institute for Research and Extension (NAPHIRE) in the Philippines under the ASEAN-Australia Economic Cooperation Programme.

Before the improved design was made, three types of existing shellers - the crushing non-crushing and semi-crushing types - were tested and evaluated to determine their operational deficiencies. The design of the improved mobile maize sheller comes from the results of the performance testing and evaluation conducted.





Major improvements include modification in the power transmission system of the existing design resulting in a more compact design for better mobility; baffles and rasps on the shelling concave to increase shelling recovery; and application of suction air to separate light impurities from the shelled grains. All these modifications make the new machine more efficient and easy to operate and maintain.

This prototype was field tested in Isabel, Philippines. Results from the evaluation revealed that the improved machine performs better than existing commercial shellers. It obtained the highest efficiency of 97.11% lowest mean unshelled loss of 0.14%; lowest mean damaged grain of 2.75% and the lowest mean impurities of 0.79% among the crushing type sheller when shelling 22-35% moisture content corn.

Considering the losses due to shelling which in the case of the Philippines in 1986 was estimated at 17,766.75 metric tons equivalent to US \$ 5.14m, savings through the use of the new improved corn sheller could result in millions of dollars.

For details contact: National Post-Harvest Institute for Research and Extension (NAPHIRE), Munoz, Nueva Ecija, Philippines. (Asia-Pacific Tech Monitor July-August 1989, 21-22)

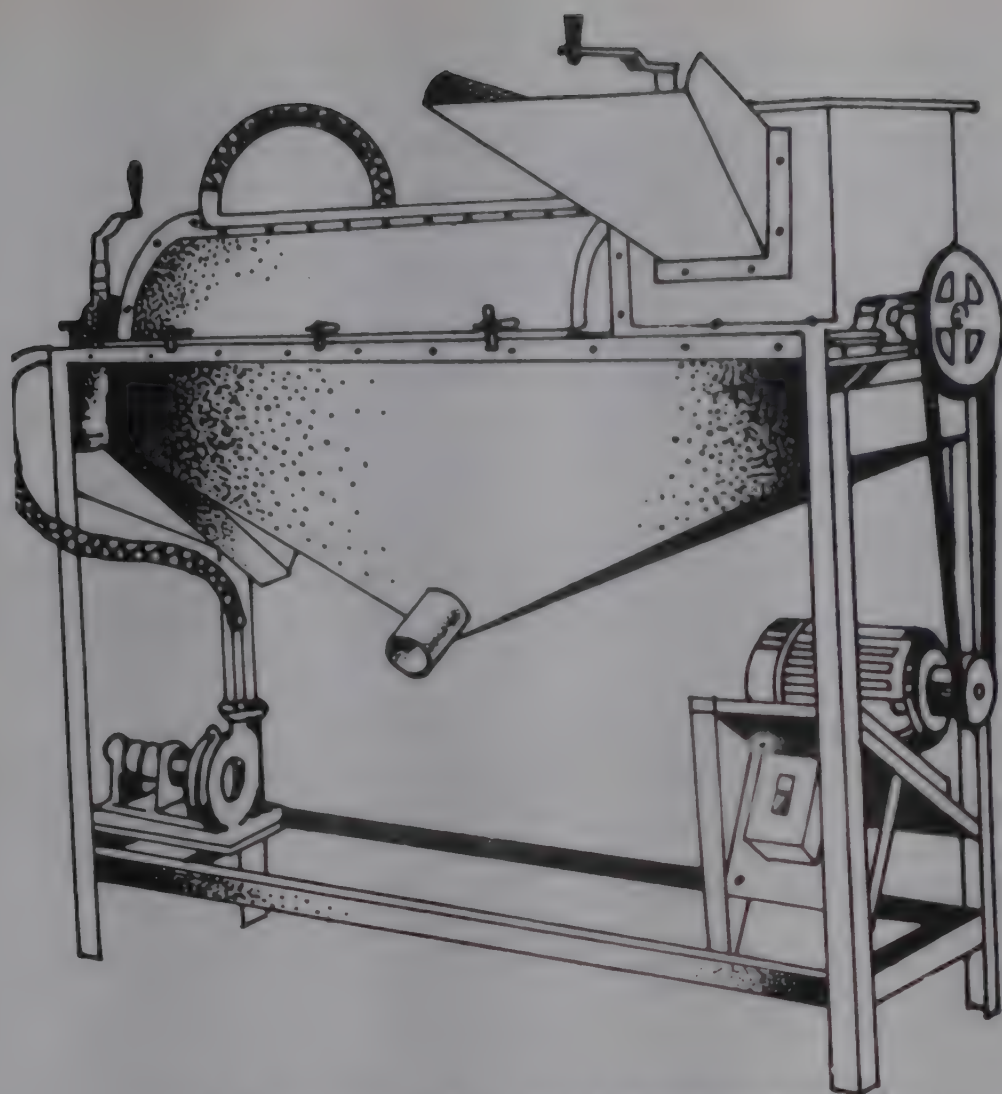
#### Vegetable seed extractor

An axial-flow vegetable seed extracting machine based on the design developed by the College of Agricultural Engineering Punjab Agricultural University in Ludhiana, India, is now commercially fabricated by a local manufacturer.

Ripe fruits of various vegetables like tomato brinjal (aubergine or eggplant) chillies, cucumber squash-melon watermelon summer squash etc. are crushed by the fast revolving knives and fall through the concave screen.

Three interconnected water spraying pipes with holes running along the length of the rotor have been provided. A small centrifugal pump delivers water into the spraying pipes out of which the water come in the form of jets.





Axial-flow vegetable seed extracting machine.

The machine is operated by a 2 hp electric motor. A feed regulating gate prevents clogging of the machine. Similarly a pulp size regulating gate controls the size and flow of the pulp ejected from the machine.

As the ripe fruits are crushed by the fast rotating blades mounted on the rotor the water jets wash out the seeds and the crushed pulp is ejected from the seed outlet. The seeds are retained on a fine screen placed over the drum while water passes through.

For convenience, the machine could be best installed near a tube well or a water tank at sufficient height so that water can be fed directly into the crushing chamber. If enough pressure is available one may connect the spraying pipes to the water source; in this case there is no need to run the pump.

It is essential that sufficient water is available for smooth operation of the machine.

For details, contact: National Agro Industries Link Road  
Industrial Area-A Opp. Transport Nagar Ludhiana-141003 Punjab  
India.

(Asia-Pacific Tech Monitor July-August 1989, 21)



### 32 New device to chip tapioca

A mechanical chipper for tapioca has been developed by the Department of Agricultural Processing of TNAU. Chipping and drying of tapioca will prevent deterioration of its root like decolouration and decay after harvest within a short period of one week.

At present, the tuber is sliced manually resulting in waste of time besides being inefficient. It is also a tedious operation. The new machine is a vertical type motorised chipping gadget suitable for chipping tapioca, potato, carrot and radish.

A mechanised tapioca peeler run by one HP motor has also been developed. At present, peeling is done manually by women-folk with the aid of sharp-edged knives which is a time-consuming operation besides resulting in loss of starch and lower output.

The machine has a capacity of 950 kg an hour with a peeling efficiency of 83 per cent. Starch loss will be only about five per cent. The machine will save the cost of operation to the extent of 87 per cent.

(Financial Express 23 January 1990, 8)

### 33 An end to grit picking

A small but essential stage in processing cereals has been simplified. The Central Institute of Agricultural Engineering, India, has designed, developed and tested a hand-operated grain cleaner for cereals and pulses. The cleaner (Figure 1) is made of mild steel and contains two screens with different sized meshes. Separation takes place on the basis of the difference between the size of the foreign matter and of grain.

The cleaner is suspended from an elevated point by four ropes. The screens are interchangeable according to the type of grain. Grain is fed into the cleaner in batches of about 5-10 kg. and the cleaner is swung to and fro like a cradle by the operator until all the grain is screened. The cleaned grain is collected on the bottom sieve, and this can be emptied by pulling a spring-loaded shutter.

Impurities of a larger size, such as stubble, chaff, etc., are retained on the top sieve and can be removed easily. Below the bottom sieve dust, dirt, broken pieces and shrivelled grain fall through during the operation and can be disposed of at intervals.



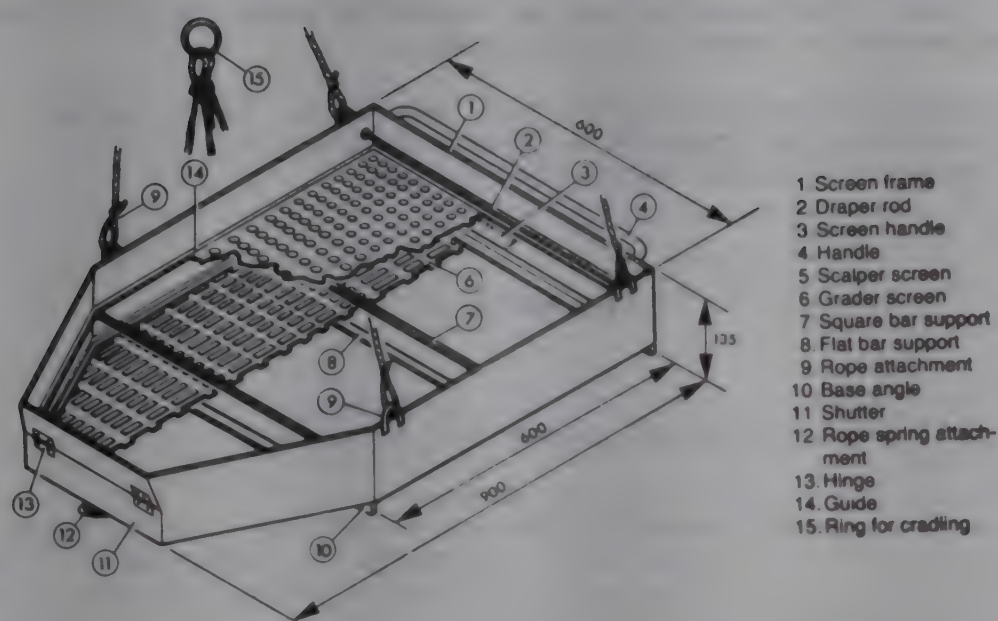


Figure 1. Hand-operated double-screen grain cleaner

The weight of the grain cleaner is 14 kg and it can be manufactured for Rs.535 (Sterling 20). It is suitable for cleaning wheat, chick peas, soyabeans and other major cereals and pulses. One person can handle between 150 and 225 kg of grain per hour, depending on the type of grain to be cleaned.

More information about the double-screen grain cleaner is available from: Dr R.P. Kachru, Head Post-harvest Engineering Division, Central Institute of Agricultural Engineering, GTB Complex, TT Nagar, Bhopal-462 003, India.  
(Appropriate Technology 16(3), 1989, 25)

### 34 Peeling machine

Producers of potato chips and other products from root vegetables have good news from Dornow Food Technology (DFT), West Germany. DFT has introduced a new peeling machine that peels without waste water.

The roller peeling machine is equipped with 5 to 14 peeling rollers, with an internal diameter of 500 to 1,500 mm. The machine has a peeling capacity of 0.5 to 10 tons of raw vegetables per hour.

With its facility of peeling without waste water the DFT claims that the machine will cut costs for waste disposal. The burden on the municipal waste water system will also be reduced and the peels could be recycled as animal feed, fertilizer etc.  
(Science Today December 1989 31)



## 35 Doughnut machine

The Donut Man Model 101 automatic doughnut machine can be used in bakeries and restaurants and at fairs to make up to 1,200 fresh miniature doughnuts in front of spectators.

For further information write to: American Food Lines, 9851 13th Ave N, Minneapolis, Minnesota 55441, U.S.A.  
(Industrial Products Finder 18(3), 1989, 162)

## Packaging

## 36 Consumption estimates for major packaging materials

(In metric tonnes)

Material	1973-74	1978-79	1982-83	1989-90	1994-95
Jute	-	-	-	135,500	-
(a) Hessian	538,985	594,300	694,000	-	-
(b) Sacking	109,245	120,900	114,000	-	-
Paper and paperboard	567,300	668,000	875,000	180,000	155,000*
(a) Cartons	138,400	167,000	219,800	-	-
(b) Corrugated board	92,000	133,000	175,000	-	-
(c) Bags/sacks	-	100,000	131,200	-	-
(d) Wrappers, labels & pouches	268,000	187,200	245,000	-	-
(e) Others	-	-	105,000	-	-
Black and galvanised plates	-	125,000	180,000	-	-
Tinplates	-	185,000	261,000	350,000	114,000*
Plastics (Thermoplastics)	61,440	84,400	118,100	698,000	349,000*
Aluminium foil	-	4,800	6,000	12,750	18,750*
(a) Aluminium cans (tonnes)	1,800	3,000	4,500	3,900	5,200
(1975)		(1984)	(1989)		
(b) Aluminium collapsible tubes (tonnes)	2,800	4,000	6,000	-	-
(1975)		(1984)	(1989)		
Glass bottles, etc.	-	-	400,000	600,000	300,457*
Cellophane	-	-	6,650	-	-

\* for packaging only

(Financial Express 26 December 1989, XII)



## Analysis

## 37 Salt analyser

Pocket Pal analyser from Presto-Tek can make quick and easy measurements of sodium chloride concentration up to 20%. It is suitable for use in the laboratory or at the process line. The SM-8 has two calibration modes: fixed, which is calibrated to reagent grade NaCl; and variable which can be calibrated to user's particular application.

For further information write to: Presto-Tek Corporation  
Instrument Divn, 4101 North Figueroa St, Los Angeles, CA 90065  
U.S.A.  
(Industrial Products Finder Annual 1989, 629)

## 38 Microprocessor controlled moisture analysers

Computrac MAX-Series Moisture Analyser from Arizona Instruments Corporation, USA, accurately determines the moisture level in liquids or semi-solid samples in as fast as three minutes. The instrument automatically weighs and calculates the per cent moisture of solid and displays the results on large LED readout. Depending on the application, the instrument will have a display accuracy of 0.01%. MAX-50 is designed to determine the moisture levels down to 0.1%. It has a programmable heating range from 25 C to 225 C and samples size range from 1 to 20 g. A dual temperature program for faster heating on high moisture samples is also available. Based on a thermogravimetric principle, the instrument utilises computer technology to reduce test times and increase precision over standard vacuum ovens or convection oven drying procedures. The moisture is driven from the testing sample by heating it at a constant programable temperature and an electronic force balance records the weight loss over time and calculates the per cent moisture. The instrument is self calibrated and requires no operator adjustment. No pre-weighing of the sample is required. User areas include pharmaceutical, dyestuff, and food industries

For further information write to: Aimil Sales and Agencies Pvt Ltd, Malhotra House, Walchand Hirachand Marg Opposite GPO, Bombay 400 001.  
(Industrial Products Finder Annual 1989, 95)



## Commercial Intelligence

## PRODUCTION (Raw Materials)

## 39 State-wise area and production of fruits in India (1986-87)

	Area in ha (thou)	Production in thou tonnes
Andhra Pradesh	325.32	3185.31
Arunachal Pradesh	9.62	22.33
Assam	41.58	550.74
Bihar	236.15	2450.00
Goa	74.80	43.80
Gujarat	81.80	1810.50
Haryana	22.26	116.66
Himachal Pradesh	135.25	400.51
Jammu and Kashmir	151.21	763.16
Karnataka	178.34	3110.49
Manipur	184.11	330.24
Meghalaya	66.99	894.53
Mizoram	94.98	1564.84
Nagaland	17.03	175.26
Orissa	25.98	175.61
Punjab	33.82	18.94
Rajasthan	3.24	5.88
Sikkim	132.33	1252.59
Tamil Nadu	56.82	489.80
Tripura	12.91	129.10
Uttar Pradesh	9.38	2.72
West Bengal	119.44	2311.90
Andaman and Nicobar Islands	34.73	277.72
Chandigarh	779.00	5320.00
Dadar and Nagar Haveli	108.52	1068.85
Delhi	2.67	21.08
Pondicherry	0.11	1.20
Lakshadweep	0.76	6.89
	0.63	4.15
	0.44	5.90
	0.11	1.97
Total	2940.23	25559.57

(Financial Express 26 December 1989, VIII)



## 40 State-wise area and production of vegetables

	Area in ha(thou)	Production in thou tonnes
Andhra Pradesh	79,330	9,56,184
Assam	92,797	3,84,961
Bihar	7,81,402	77,00,936
Gujarat	84,000	13,83,000
Haryana	40,500	4,05,000
Himachal Pradesh	16,400	56,000
Jammu and Kashmir	1,500	15,000
Karnataka	2,27,704	35,32,956
Kerala	2,19,905	33,50,708
Madhya Pradesh	1,35,916	13,98,114
Maharashtra	2,14,139	8,29,592
Manipur	51,734	94,760
Meghalaya	23,536	2,68,641
Nagaland	2,987.8	32,477.7
Orissa	6,85,000	57,10,060
Punjab	78,000	12,54,980
Rajasthan	59,093	1,71,369
Sikkim	8,950	56,200
Tamil Nadu	2,21,637	23,15,541
Tripura	25,250	2,10,500
Uttar Pradesh	7,72,096	1,00,45,000
West Bengal	4,10,485	39,64,617
Andaman and Nicobar Islands	2,700	16,200
Arunachal Pradesh	18,439	64,899
Dadar and Nagar Haveli	285	2,000
Delhi	46,920	6,10,900
Goa Daman and Diu	6,500	55,250
Mizoram	7,227	57,588
Pondicherry	709	12,039
Chandigarh	-	1,970
All-India	43,15,141.8	49,59,942.7

(Financial Express 26 December 1989, VIII)

## 41 Increase in production of oilseeds

Import of edible oilseeds has been considerably brought down due to several measures which had helped in increased production. The import has been only to the tune of less than 3.5 lakh tonnes this year as against 18.2 lakh tonnes during the oil year, November 1987 to October 1988.

According to the Indian Council of Agricultural Research (ICAR), the production of edible oilseeds has gone up by twofold to 18 million tonnes during 1988-89. The increase in production has been attributed to various measures taken by the ICAR.



As part of its strategy to boost production and reduce the imports the ICAR has evolved 40 new and hybrid varieties which have an yield potential of four times the national average under farm conditions. These include rapeseed and mustard varieties for late sowing conditions and varieties with resistance to white rust and suitable for salinity conditions

Since the setting up of the Technology Mission for Oilseeds in 1986 an Integrated approach to boost production has paid dividends in not only increased production but has also resulted in higher yield per hectare.

The per unit production registered an increase by 69 kg per hectare to 840 kg in the current year since 1984-85. Various technological inputs also resulted in the enhancement of production. (The Hindu 23 January 1990, 11)

### Production (Industrial)

42 Processing and production of oils fats for the period April to November 1989

(Quantity in M.T.  
Amount in Rs.)

Commodity oilcake/ seed/bran	Processed	Production of S.E. oil			Product of extract M.T.
	M. T.	Edible M. T.	Industrial M. T.	Total M. T.	
Rice bran	1247685	79067	108185	187252	1046014
Sunflower oilcake	121900	12622	1593	14215	107393
Rapeseed oilcake	681015	48521	16992	65513	610951
Salseed	100342	3168	9584	12752	86567
Mango kernel	13431	-	1215	1215	11635
Mahua seed oilcake	27321	179	1947	2126	24396
Kokum seed oilcake	514	29	29	58	445
Kardi oilcake	24122	1378	523	1901	22296
Sesame seed oilcake	9347	481	265	746	8583
Nigerseed oilcake	1649	104	-	104	1479
Copra oilcake	31086	481	2230	2711	28876
Kusum seed	957	-	99	99	824

(The Economic Times 7 January 1990, 8)



## 43 Trends in production of certain selected processed foods

(Value in Rs. lakhs)

Name of the products	Accounting Unit	1975				1985			
		No. of units	Installed capacity	Production Qty.	Production Value	No. of units	Installed capacity	Production Qty.	Production Value
Biscuit	Tonnes	31	104,448	70,348	5,839	33	1,47,984	1,35,731	18,500
Confectionery	"	22	35,928	12,671	1,330	22	35,928	26,270	4,203
Bread	"	17	83,204	81,800	1,681	21	1,21,945	1,18,273	4,730
Soft drinks	Mill bottles	34	1,731	670	2,875	50	2,310	1,688	1,520
Malt extracts	Tonnes	2	4,800	2,278	131	5	13,060	6,705	516
Weaning food	"	-	-	6,500	975	3	10,300	4,910	1,230
High protein food	"	16	8,951	-	-	9	13,600	8,370	1,700
Starch	"	9	168,600	1,10,000	2,500	11	2,66,580	1,42,000	5,514
Dex monohydrates	"	2	30,600	10,000	450	6	34,200	27,000	2,200
Chocolate	"	5	4,410	1,800	376	6	8,497	7,140	2,700
Drinking chocolate	"	3	1,500	200	15	3	1,500	325	6,825
Cocoa powder	"	3	642	105	35	5	642	225	76
Cheese	"	1	600	600	102	2	1,125	1,150	460
Cocoa butter substitutes	"	-	-	-	-	1	3,000	114	37
Fruit and vegetable	"	31	97,867	26,000	1,001	32	1,07,867	54,000	-
Baby food	"	10	29,578	26,321	4,034	18	62,478	50,133	17,045
SMP	"	-	-	-	-	22	50,000	22,000	5,280
WMP	"	-	-	-	-	22	-	16,000	4,320
Condensed milk	"	6	13,300	5,000	600	6	13,300	7,500	1,210
Butter	KL	10	12,500	6,000	950	10	12,500	11,584	3,360
Ghee	Tonnes	19	16,500	9,500	1,950	19	16,500	21,000	8,510
Malted milk food	"	9	20,418	15,000	2,550	9	20,988	24,000	7,929
Ice-cream	KL	7	9,490	4,200	395	8	10,895	10,500	11,666
Fish	Tonnes	6	5,500	2,100	-	9	45,500	5,000	3,500
Meat products	"	4	1,600	1,181	260	7	-	20,000	4,000
Macaroni noodles	"	-	-	-	-	4	34,400	7,700	785
Flour milling	Th. tonnes	158	4,993	1,666	26,645	177	5,288	3,900	7,900
Breakfast food	-	-	-	-	-	-	-	-	-
Pearl barley	Tonnes	4	6,590	630	72	4	6,590	820	248
Corn flakes	"	3	2,550	208	22	3	2,550	525	61
Oat flakes	"	-	-	-	-	1	-	-	-
Snack food	"	-	-	-	-	3	3,223	225	17

Source: DGTD annual reports.

(Financial Express 26 December 1989, I)



## Export

## 44 India's exports of spices

	Quantity - '000 MT		Value - Rs. crores	
	1987-88		1988-89	
	Q	V	Q	V
Pepper	41.01	240.58	41.07	187.78
Cardamom (small)	0.27	3.40	0.79	10.28
Cardamom (large)	0.16	0.70	0.43	1.86
Chillies	6.12	8.33	5.42	12.06
Ginger	2.63	4.89	5.20	9.22
Turmeric	8.74	9.23	16.52	17.37
Curry powder	2.56	4.38	2.73	5.04
Seed spices	7.71	10.56	17.53	18.37
Other spices	0.65	1.04	4.26	2.51
Spices oils and oleoresins	0.43	14.97	0.49	18.30

Source: Spices Board  
(Financial Express 5 January 1990, 8)

## 45 Cashew exports up

The export of cashew kernels registered a growth of 38 per cent both in quantity and value during January-October 1989.

The exports during the ten months was 36,345 tonnes valued at Rs. 293.63 crores compared to 26,363 tonnes valued at Rs. 213.19 crores during the same period of 1988.

The import of raw cashewnut during January-October 1989 totalled 26,514 tonnes valued at Rs. 35.69 crores marking an increase of 35 per cent in quantity and 34 per cent in value under the imports during the same period of 1988, according to a cashew export promotion council.

(Financial Express, 24 January 1990, 3)



## Exports of oilseed extractions

(Quantity in M.T./  
Value in Rs. crores)

	Apr-Nov. 1989 (Actual)		Apr-March 1990 (Projection)	
	Quantity	Value	Quantity	Value
Deoiled rice bran	3,57,970	34.47	5,50,000	55.00
Rapeseed extractions	4,41,159	53.31	6,00,000	80.00
Sunflowerseed extractions	42,034	5.70	75,000	10.00
Salseed extractions	38,312	3.01	75,000	6.00
Mango, kernel, sesameseed and other extractions	16,828	3.40	50,000	10.00
Sal, mango kernel and other oils	1,850	4.28	4,000	9.00
Total	8,98,153	104.17	13,54,000	170.00

(The Economic Times 7 January 1990, 8)

## Sesame seed exports to touch Rs. 1000 m

Sesame seed exports are poised to touch a record Rs. 1000 million in the current year.

Shipments upto November 1989 amounted to 35,000 tonnes valued at Rs. 450 million. It is expected that by the end of March next, at least 50,000 tonnes of more seed valued at Rs. 650 million would be exported.

This year, a world-wide shortage has developed in sesame owing to a sharp fall in production in China and Latin America. On the other hand, due to a good monsoon, Indian production is estimated at 6,50,000 tonnes. The world trade sesame seed is about 4,00,000 tonnes, the major exporters being China, Mexico and Nicaragua.

India will be in a position to take advantage of this shortage especially because sesame oil is not widely used in the country except for some consumer preference in the south. Sesame oil is also used to the extent of five per cent compulsorily in the manufacture of vanaspati oil.

During 1988-89, export of sesame seed amounted to 18,000 tonnes valued at Rs. 200 million, which is now stated to go up to 85,000 tonnes valued at Rs. 1000 million. However, about 30 to 40 per cent of the export contracts are under rupee clearance, even as India's exports are on a global scale with direct buyer-to-buyer contact in the West.



One damper is the very stringent storage control order which prohibits storage beyond the stipulated limits. With a view to curbing speculation and hoarding the government has introduced a law and districts with specific storage limits. In category C, for instance a licence-holder is not permitted to store more than 75 tonnes at any given point of time.

(Economic and Commercial News 20(3) 1990, 4)

#### 48 Groundnut meal export resumes

The export of groundnut extractions has come to a virtual standstill as a result of the poor quality of the crop. Gujarat which is the largest producer of groundnut in the country is expected to contribute a mere 16 lakh tonnes (on inshell basis) this kharif season, against 24 lakh tonnes last year.

Not only is the 33 per cent fall in volume significant the quality too has turned out to be wanting in several respects. It is reported that the protein content in the kernels this year is less than normal, while the oil content and physical characteristics are also below expectation.

This has caused a serious problem to exporters of groundnut extraction. Based on the timely advent and progress of monsoon, the trade was expecting a bumper crop of groundnut in Gujarat, estimated by some as high as 30 lakh tonnes.

However, nature willed otherwise. The crucial late rains failed. The crop suffered moisture stress conditions during the critical pod maturation period. This indeed has affected the overall quality of the Gujarat crop.

Even by August and early September relying on optimistic crop forecasts exporters had contracted for over 200,000 tonnes of groundnut meal and for over half of the contracted quantity the shipment period was between November and February.

These contracts worth approximately Rs. 20 crores, were for supply of meal containing 50 per cent oil and albuminoids (50% O and A). However when actual arrivals of the harvested crop commenced suppliers found the protein content lower and refused to deliver 50 per cent O & A quality extraction creating an impasse on the export front.

Mercifully, the Groundnut Extractions Export Development Association (GEEDA) broke the stalemate. In a joint meeting with some buyers a few days ago it was decided that contracts stipulating 50 per cent O & A combined will be converted into contracts for the supply of 45 per cent O & A and that the sellers will grant the buyers a discount of Rs 150 per tonne as allowance for lower protein content.



Respecting the revised terms, initial shipments are reported to have commenced and will pick up momentum. As a consequence, the local market which had weakened as firmed up again.  
(The Economic Times 9 December 1989, 3)

#### 49 Soyameal export

Exporters of soyabean extractions are fully geared to meet a second active season in succession. The export trade has never had it so good with a large supply of the essential raw material - soya-bean - and numerous overseas enquiries.

Thanks to a good monsoon this year, soyabean production has gone up by about 10 per cent to 18.5 lakh tonnes during kharif for the crop year 1989-90. Major contribution is of course, from Madhya Pradesh - declared as soyabean state - accounting for some 14 lakh tonnes and the rest coming from Maharashtra, Rajasthan, Uttar Pradesh and others.

Last year (1988-89) soyabean output was 17 lakh tonnes. By September this year, the general expectation of the soyabean crop was as much as 24 lakh tonnes. However, because of unfavourable weather towards the fag end of the monsoon, the yields suffered and the actual output was restricted to 18.5 lakh tonnes.

Be that as it may export of soyameal is once again poised to scale a new peak this year both in terms of volume and value. During the financial year 1988-89 the value of foreign exchange earned on soyabean extraction was a whopping Rs. 297 crores. This was almost 50 per cent of the total foreign exchange contributed by the oilseeds oilmeals and oils group.

The volume of export was 743,354 metric tonnes out of which nearly 75 per cent equal to 570,000 tonnes were exported between October 1988 and March 1989.  
(The Economic Times 16 December 1989, 6)

#### 50 Export of marine products

India exported a record Rs. 597.85 crore worth of marine products last year despite stiff competition from China, Thailand, Ecuador and the Philippines.

The previous year, it exported 90,179 tonnes of marine products valued at Rs. 531.20 crore, sources said.

Export of frozen shrimp last year was 56,835 tonnes valued at Rs. 47,033.15 crore while export of frozen lobster tails suffered a setback with only 1,663 tonnes (valued at Rs. 2,360.44 lakh) compared to the 1988 figures of 1,863 tonnes (valued at Rs. 2,473.52 lakh). The export of cuttlefish and fillets decreased from 9,195 to 8,262 tonnes.



However the export of frozen squids showed a phenomenal rise last year. It rose to 16,374 tonnes from the previous year's figure of 7,621 tonnes. The export of fresh frozen fish also received a setback.

(Deccan Herald 1 February 1990, 14)

## 51 Silver pomfret export allowed

Export of fresh and frozen silver pomfret of weight two hundred grams and above will be allowed from Tuticorin Madras Kakinada Vishakhapatnam Paradeep and Calcutta ports says a notification issued by the office of chief controller of imports and exports.

It added that such fish of weight 300 grams and above will be allowed to be exported from all other ports on decontrolled basis.  
(The Economic Times 18 January 1990, 4)

## 52 Onion exports

Onion exports are likely to exceed three lakh tonnes this year against last year's 2.35 lakh tonnes and 1.41 lakh tonnes in 1987-88 reports UNI.

The government has asked the national agricultural co-operative marketing federation of India limited (Nafed) to maximise onion exports.

The Deputy Prime Minister Mr. Devi Lal who is also Agriculture Minister has ordered NAFED to immediately purchase for export 30,000 tonnes of onions from Nasik district of Maharashtra where prices have crashed to a record low.

The Minister also agreed to enhance the annual export quota from 2.75 lakh tonnes to 3.25 lakh tonnes. Nasik district produces 50 per cent of the country's requirement of 20 lakh tonnes of onions.  
(The Economic Times 2/5 January 1990, 7)

## 53 Inspection for export rice made compulsory

The commerce ministry has decided that compulsory pre-shipment inspection for basmati-rice export should be carried out either the export inspection agency (EIA) or the agricultural marketing adviser (AMA)

These agencies have been advised to enforce the prescribed standards strictly to ensure that non-basmati rice is not exported in the name of basmati rice and that consumers get rice of quality standard according to an official release.



The government recently reviewed the procedures for preshipment inspection of basmati rice and decided that there should be strict compliance with quality standards.  
(The Economic Times 1 January 1990, 1)

## Trade Information

### 54 Italy for Tie-ups in food processing sector

Italy in concert with the United Nations Industrial Development Organisation (UNIDO), is drawing up a scheme that will lead to tie-ups between Indian and Italian firms in the food processing sector. The proposed scheme will be funded by the World Bank. There is a bright prospect for Indo-Italian cooperation in the processed foods industry says Dr. R. Orlando Chairman of the Italian section of the India-Italy Joint Business Council. Steps are being taken to boost Indo-Italian ventures. This includes active participation by Italy in the trade fairs, the setting up of three Italian banks and two trade offices in Bombay and Delhi. A number of items have been identified for potential exports from India and these include processed food products, artificial and synthetic fibre and readymade garments.  
(Industrial Products Finder 18(4) 1990, 107)

### 55 BIS opens branch office in J & K

A new branch office of Bureau of Indian Standards has started functioning at Srinagar in the State of Jammu and Kashmir. This has been done to give boost to standardisation and quality certification in the state. This office will help in disseminating information on standardisation, certification, quality assurance, testing and other services offered by the Bureau. It will also provide assistance in procurement of Indian and International standards. The Bureau will maintain close liaison with and render service to industry trade and commerce in the State of Jammu and Kashmir.  
(Industrial Products Finder Annual 1989, 293)

### 56 Information centre by DGTD

The office of the Director General of Technical Development (DGTD) is in the process of setting up a technology information centre attached to it.

Announcing this here on Friday, the DGTD Mr. H. C. Gandhi said that the main objectives of the centre would be to collect analyse and disseminate information on industrial technologies.



The centre would provide information on the sources of availability of commercial proven technologies and the future development trends.

(Financial Express 6 January 1990 4)

#### 57 BSN Groupe expertise for Britannia Industries

Britannia Industries Ltd may soon get the technical and marketing support from one of the largest food products companies in the world, BSN Groupe of France.

According to Mr. J. M. Rajan Pillai, the tie-up will strengthen Britannia's drive to dominate the bread and biscuits market and diversify into dairy products like chocolates ice creams and yogurts.

(Financial Express 5 January 1990, 4)

### Food Regulation Quality Control and Hygiene

#### 58 Solvent extracted oil, de-oiled meal and edible flour (Control) Amendment Order, 1989

G.S.R. 767(E):- In exercise of the powers conferred by section 3 of the Essential Commodities Act 1955 (10 of 1955) the Central Government hereby makes the following order further to amend the Solvent-extracted oil, De-oiled Meal and Edible Flour (Control) Order, 1967, namely:-

1. (1) This order may be called the Solvent-Extracted Oil, De-oiled Meal and Edible Flour (Control) Amendment Order, 1989.

(2) It shall come into force on the date of its publication in the Official Gazette

2. In the said Order in the Fifth Schedule in the table to item 4 the following entries under column 5 shall be inserted against corresponding serial numbers in column namely:-



TABLE IV

## Requirements for Solvent Extracted Edible Flour

## Characteristics

		Requirements Soyabean			
1	2	3	4	5	6 7
(i)					9.0
(ii)					48.0
(iii)					-
(iv)					7.2
(v)					0.4
(vi)					1.5
(vii)					-
(viii)					4.2
(ix)					170
(x)					30
(xi)					-
(xii)					-
(xiii)					50,000
(xiv)					10
(xv)					nil
(xvi)					-
(xvii)					-

[ No. 1/2/89-SEO ]

A. K. GOSWAMI Jt. Secy.

(The Gazette of India Part II - Section 3-Sub-section (1) No. 433, 1989)

## New and revised Indian Standards on Food

1. IS 548 (Part 2/Sec 21) : 1988 Methods of sampling and tests for oils and fats: Part 2. Purity tests. Section 21. Tests for detection of animal fat in vegetable oils and fats and vice-versa by GLC (fourth revision) Gr.2.
2. IS 1000 : 1989 Milk and milk products - lactose commercial (first revision) Gr.2
3. IS 1307 : 1988 Aldrin EC (third revision). Gr.2
4. IS 1483 : 1988 White bread (third revision) Gr.4



5. IS 2237 : 1989 Ready idli mix (first revision) Gr.4
6. IS 3811 : 1988 Alcoholic drinks - rum (second revision) Gr.2
7. IS 4100 : 1988 Alcoholic drinks - gin (first revision) Gr.1
8. IS 4450 : 1988 Alcoholic drinks - brandies (second revision) Gr.2
9. IS 7463 : 1988 Wheat flour (maida) for use by bisuit industry (first revision). Gr.2
10. IS 7464 : 1988 Wheat flour (maida) for use in bread industry (first revision). Gr.3
11. IS 8538 : 1988 Alcoholic drinks - toddy (first revision) Gr.1
12. IS 12408 : 1988 Gum karaya, food grade, Gr.3
13. IS 12451 : 1988 Margarine Gr.6
14. IS 12486 : 1988 Meat inspection table Gr.1
15. IS 12501 : 1988 Ferbam, technical Gr.2.
16. IS 12502 : 1988 Glyphosate, technical Gr.2
17. IS 12543 : 1988 Meat and meat products - poultry products - canned egg curry, Gr.2
18. IS 12516 (Part 2) : 1988 Method for determination of physical characteristics of doughs made from wheat flour: Part 2. Rheological properties using an extensograph Gr.3
19. IS 12516 (Part 3) : 1988 Method for determination of physical characteristics of doughs made from wheat flour: Part 3. Water absorption and rheological properties using a valorigraph Gr.3
20. IS 12529 : 1988 Storage of foodgrains - storage losses by insects - Methods for estimation Gr.I



21. IS 12516 (Part 1) : 1988

Method for determination of physical characteristics of doughs made from wheat flour Part 1. Water absorption and rheological properties using a farinograph. Gr.4

22. IS 12544 : 1988

Carbonated beverages - non alcoholic - beer Gr.1

23. IS 12561 : 1988

Poultry products - pickled quail eggs. Gr.3

24. IS 12564 : 1989

Fried jack fruit chips Gr.2

25. IS 12565 : 1989

Salted and spiced fried dals Gr.2

26. IS 12566 : 1989

Ready-to-eat" extruded snacks. Gr.2

27. IS 12569 : 1989

Potato French fries. Gr.3

28. IS 12575 : 1989

Fried potato chips. Gr.2

29. IS 12582 : 1988

Ferbam WP. Gr.1

30. IS 12609 : 1989

Pesticides - determination of residues in foods - fenthion Gr.2

31. IS 12610 : 1989

Pesticides - determination of residues in foods - phosphamidon Gr.1

32. IS 12611 : 1989

Pesticides - determination of residues in foods and water - endosulfan, Gr.1

---

(Standards India 3(1), (3), (5-7), 1989)

## 60 Mustard oil disallowed in vanaspati

The government has decided not to extend the facility of usage of expeller mustard/rapeseed oil in the manufacture of vanaspati beyond today, December 15, 1989, reports PTI.



The decision has been taken after reviewing the existing policy regarding the usage of such oil in the manufacture of vanaspati and also having regard to the overall availability of oils and the fresh kharif crop according to an official statement here.

Earlier the government had allowed usage of 20 per cent expeller mustard/rapeseed oil in the manufacture of vanaspati.  
(The Economic Times 16 December 1989, 2)

#### 61 Ban on use of mineral oil in food articles

The Government proposes to prohibit use of mineral oil in any form in food articles except where such addition is specifically permitted in accordance with the standards laid down under the Prevention of Food Adulteration Rules.

The Prevention of Food Adulteration Rules are to be amended accordingly an official release said.  
(Deccan Herald 24 January 1990, 14)

#### 62 Chewing pan (betel)

Pan is chewed in almost every part of Indian subcontinent for a variety of reasons such as for digestive (digesting rich food) carminative (expelling flatulence) and aphrodisiac and aromatic properties. A very large number of people take tobacco also with pan. Because of the commonality of pan consumption in India all the year round, BIS has formulated Indian Standards on some of the items used in its preparation. These are: (a) Kattha (IS 4359 : 1967); (b) chewing tobacco, Zarda flake type (IS 2344 : 1973) (c) chewing tobacco, manufactured, minced type (IS 3041 : 1973); (d) cardamom, both capsules and seeds (IS 1907 : 1984); and (e) cloves whole and ground (IS 4404 : 1975). Besides, an Indian Standard is available which specifies methods of sampling and test for Kattha.

These standards prescribe general requirements, packing and marking specifications and sampling norms for the above items. The Indian Standard on cloves (IS 4404 : 1975) additionally stipulates their chemical requirements as well as their methods of storage and transportation. The Indian Standards on Kattha and the two varieties of zarda prescribe methods of test to verify the conformance of the end products to the relevant Indian Standards. Briefly, the general and testing requirements for the above items as stipulated in the Indian Standards are as under :

Kattha shall be free from water soluble catechu - tannic acid or cutch leaves bark and other cellulosic materials adulterants and moulds as well as unpleasant odours and be astringent with slightly bitter taste. Tests are required to be conducted as stipulated in IS 2962 : 1964 to determine the conformity to requirements like catechu content and poisonous metals like arsenic lead copper zinc and tin in Kattha.



-- Zarda is required to be free from mould attack and shall not contain any substance injurious to health as covered under Dangerous Drugs Act, 1930. Besides, Zarda is required to meet the requirements for nicotinic acid, total ash and acid-insoluble ash when tested in accordance with the methods laid down in "IS 5643 : 1970. Methods of test for tobacco in tobacco products"

-- Cardamom capsules shall be of colour ranging from light green to brown, cream and white, be of globular size or three-cornered having ribbed appearance; be well-formed with sound seeds inside, have characteristic and fresh flavour; and be free from foreign taste and aroma as well as moulds and insect infestation. The proportions of empty, malformed, immature and shrivelled capsules and light seeds of cardamom as well as extraneous matter in different grades have also been prescribed in the Standard. Besides, levels for moisture content and volatile oil content have been stipulated which may be determined in accordance with the test methods given "IS 1797 : 1986 Methods of test for spices and condiments"

-- The whole cloves should be fully grown and reddish brown to blackish brown in colour; have a strong aromatic spicy flavour; and be free from mustiness, moulds and insects. The cloves may be graded on the basis of percent clove stems, headless cloves and extraneous matter. The permissible moisture content and volatile oil content in each grade has and may be tested in accordance with the methods laid down in the relevant Indian Standard. Not many people have arrangements for preparing pan in their homes. Such persons throng around roadside pan vendors for their daily needs. Most of the consumers are either oblivious of or ignore the filthy conditions in which pan vendors carry on their business. As health and hygiene are important aspects of national well being, BIS has also formulated a code of hygienic conditions for pan (betel) stalls and vendors (IS 968 : 1973). This standard provides guidelines on basic hygienic conditions for these shops and is subject to the provisions of the Prevention of Food Adulteration Act, 1954.

The salient aspects of Code are:

a) approval of public health authorities for the site to establish the pan shop whose area should not be less than 1.50 x 1.50 m (2.25 m) and the platform height for keeping the pan leaves not less than 25 cm above the sitting arrangement;

b) proper arrangement for waste water drainage and disposal;



c) storage of pan in glass cupboard and ingredients used in it in containers covered with lids;

d) use of stainless steel or chinaware or aluminium or tincoated brass utensils of easily cleanable and non-corrosive nature for kattha chuna etc;

e) storage of potable water in receptacles with tight-fitting lids and taps;

f) provision of spittoon containing sand or slaked lime or both in the pan shop;

g) observance of personal hygiene by the pan vendors and persons employed in the pan shop; and

h) provision of a dust bin of approved pattern for depositing the shop wastes.

(Standards India 3(6), 1989, 224-5)

## 63 Hygienic conditions for the sale of cut-fruits fruit juice and fruit salad

Stalls selling cut-fruits fruit juice and fruit salad are a common sight almost in all the cities in India. Since these stalls are not generally maintained properly consumption of these items from such stalls may be a potential health hazard to the consumers. Concerned with their unhygienic conditions, BIS had laid down a code of hygiene for such stalls (IS 8123 : 1976) a long time ago.

The Standard prescribes that these stalls shall be established at places approved by public health authorities and where counter service is available the height of the counter from ground level shall be not less than 2 and more than 2.5 metres.

The number of rooms in these stalls shall depend upon the job requirements. For instance only one room shall be needed for the sale of cut-fruits and fruit juice as well as storage and cutting of fruits and extracting fruit juice and their consumption in the same premises. However if fruit salad is also prepared and served for consumption in the premises there shall be two rooms. In this case while one room shall be used exclusively for serving the articles for consumption, the other shall be used for the remaining activities. The minimum floor area of each room is required to be 9 m with any one side not less than 2.5 metres and height not less than 3 metres. The Standard also requires the room to be well lighted and ventilated with smooth and impervious floors having suitable gradient to enable water to flow out in a drain or sewerage system. The walls of the room are required to be oil-painted or rendered impervious to moisture and dirt up to a height of at least 2 metres. The upper portions of the walls should be lime washed twice a year. All wood work shall be oil painted every three years.



The stall selling cut-fruits, fruit juice and fruit salad is required to have an impervious platform with potable water supply. Water if stored, should be in suitable receptacle placed on a 1 metre high stand and shall be provided with a tight-fitting cover and a tap. It shall be ensured that water is not contaminated while handling and storing.

IS 8123: 1976 stipulates that all edibles connected with the trade shall be kept in a fly-proof safe to prevent contamination by dust, flies and other insects. Before cutting or extracting juice, the fruits are required to be thoroughly washed. The juice extractor too shall be subjected to this exercise.

The utensils used for preparing and serving cut-fruits juice and salad are required to be in good condition. Broken, cracked or chipped crockery or cutlery shall not be used in the licensed stalls. Tumblers (and saucers) should preferably be of disposable type. Reusable tumblers shall be disinfected with chlorine solution followed by washing with potable water. The premises shall be sprayed once a day with pyrethrum or similar insecticides and also treated with insecticides by the Municipal Authorities or other approved bodies once in four months.

Employees hygiene is as important in dealing with the preparation and sale of edibles as that relating to various other items. The Standard therefore, makes it obligatory that the persons handling fruits shall be X-rayed for tuberculosis and inoculated against typhoid and paratyphoid A at the time of appointment and thereafter once in five years. Their stool should also be examined for cholera germs and other harmful bacteria and parasites. The employees are required to follow the norms of personal hygiene as detailed in the Standard.

The stall selling cut-fruits fruit juice and fruit salad shall neither be used for residential purposes nor should sanitary conveniences be within or communicate directly with the stall.  
(Standards India 3(7) 1989, 260)

#### 54 Energy food for poor pregnant women

The ministry of food processing industries has decided to set up manufacturing facilities for energy food to take care of iron and other nutritional requirements of expectant mothers belonging to weaker sections.

This food will be made available at a lower price according to Mr. Shard Yadav minister for textiles who is also holding additional charge of food processing industries.

Mr. Yadav told The Economic Times that two plants each involving an investment of Rs. 1.2 crore would be set up in Uttar Pradesh, to begin with. Later other states will be covered.



Giving details of the scheme, he said the first plant is to come up in Badaun district. The proposed extruded energy food will provide 100 gm, 40 calories and 14 to 16 gm protein. This is expected to cost about 80 paise.

In the second phase, MFIL planned to put up similar manufacturing facilities in West Bengal Gujarat or Goa and Tamil Nadu so as to ensure coverage of the entire country Mr.Yadav said.  
(The Economic Times 2 January 1990, 7)

## **Transfer of Technology and New Industries**

### **65 Reliable foods**

A modern snacks food plant Reliable Foods has been set up recently at Mandideep. It has been set up with technical assistance from Western and Japanese companies. The company has launched its products in the country. It has also started exporting its products to the Middle East countries. It expects a turnover of Rs.5 crore per annum.

(Industrial Products Finder 18(4), 1990, 129)

## **Personalia**



## PAN MASALA : PRESENT STATUS

The habit of chewing betel quid has acquired enormous proportion in India today. A moderate estimate of betel quid chewers in India is around 20 million. In fact, it outnumbers the smokers. The statewide prevalence of chewing habits is depicted in Table-1. Several ingredients go into the preparation of betel quid and it is time consuming to prepare the betel quid. Therefore using Indian Technology, the industry has brought forth a ready-for-consumption product packed in small convenient sachets. This product is 'Pan Masala'. It has almost all the ingredients that are present in betel quid except the betel leaf. Moreover, this product is not chewed for a long time but swallowed. With the help of different mass media, pan masala has become very popular in India and the other Third World countries. Its value has reached more than Rs. 300 crores per year. It is popular among all age groups. Pan Masala is exported to countries in the Middle and Far East.

There are more than twenty popular brands of pan masala in India. Some are sweetened while others are not. The approximate composition of pan masala is given in Table-2. It can be seen that sweet pan masala has dry fruits as a sweetening agent but some brands do contain saccharin as a sweetener. The major ingredients of pan masala are betelnut, catechu, spices and menthol. The constituents of betelnut and its major alkaloids are given in Table-3. Of these, arecoline is the most important by virtue of its toxic effects. In normal doses it is cholinergic (stimulates the parasympathetic nerve) sialogogue (induces salivation) and diaphoretic (causes perspiration) while in higher doses it depresses the central nervous system and affects dental enamel. The constituents of catechu are given in Table 4.

## Effects of chewing betelnut

Pioneering work in India on the effects of chewing betelnut, betel quid on the incidence of cancer has been done by Khanolkar (1944), Ranadive (1976) and Bhinde (1979) of Cancer Research Institute, Bombay. That chewing betelnut (supari) with tobacco increases the incidence of oral cancer is well known. The International Agency for Research on Cancer (IARC) has done comprehensive literature survey on the effects of betel quid and arecanut chewing. Several workers from India and abroad have investigated the effect of chewing betel quid with and without tobacco and also chewing arecanut with and without tobacco on the incidence of oral cancer, in general, the results of these investigations can be summarized as follows :

Table - 1.

Prevalence of Betel quid Chewing Habits

Location	Sample size X 1000	With tobacco %	Without tobacco %
Gujarat	10	3	1.5
Kerala	10	26	0.4
Andhra Pradesh	10	2.3	0.5
Bihar 1	10	13	0.4
2	10	15	1.3
Maharashtra	101	28	0.6

IARC (1985) Vol. 37

Chewing betel quid along with tobacco is proven to be carcinogenic to humans. However evidence is inadequate to indicate that chewing betel quid without tobacco is carcinogenic to humans. The carcinogenic effect of betel quid and arecanut in experimental animals has been indicated only in limited studies and hence a definite conclusion cannot be arrived at. The other major ingredient of pan masala namely catechu has also been shown by Giri et al. (Cancer Lett. 36, 189, 1987) to cause changes in the genetic material of cells in mice. It can be deduced that catechu has a potential to cause cancer.



Menthol is added to some brands of pan masala to give a cooling effect when put in the mouth. It also adds to the flavour. It was feared that addiction to menthol may occur. However, only one case so far has been reported in a woman smoking mentholated cigarettes. She however recovered when this habit was discontinued. Also, it can be deduced that addiction is more to cigarette smoking itself than to menthol alone. Menthol is added to several lozenges used to soothe sore throat. It is present in almost all cough syrups, and is approved by the Food and Drug Administration (FDA), U.S.A. for food use. Although the FAO/WHO expert committee on Food Additives has allocated an unconditional Acceptable Daily Intake (ADI) of 0-0.2 mg/kg body weight, many of the Western countries permit its use in food based on Good Manufacturing Practice (GMP).

Table-2.  
Approximate Composition of Pan Masala

Ingredients	Sada	Meetha
Betel nut (arecanut)	80	10
Dry dates (chuara)	-	70
Catechu	10	10
Lime	1	1
Spices (cardamom, clove, mace, cinnamon, menthol, etc.)	9	9

It is logical to consider that any product which contains a known toxic substance as its ingredient is likely to be harmful. It remains to be seen whether the different toxic ingredients present, act synergistically and enhance the toxicity. 'Pan Masala' as mentioned earlier, contains almost all the ingredients of betel quid except 'pan' or betel leaf. Hence it is likely that pan masala inherits the toxic effects manifested by arecanut. Several reports based on research have appeared in the newspapers regarding the harmful effects of using pan masala.

## Cytogenic effects

Assessment of carcinogenicity of a substance takes several years by the conventional procedure. There are certain short term tests which indicate whether a substance can be carcinogenic. However, one should be aware that not all the compounds, which these short term test indicate as carcinogens, may really cause cancer. These short term studies are also known as genotoxic studies, meaning thereby that the compound is toxic to the genetic material of the cells, which in turn decides whether a cell can turn into a cancerous one. Adhvarya et al. (Indian J. Med. Res. 66, 1976)

chromatid exchange (SCE) and chromosomal aberrations (CA) in Chinese hamster ovary cells. It was observed that cells treated with the extract equivalent to as little as 1 mg of pan masala for a small period of 3 hours, produced a statistically significant increase in SCE frequency, indicating the genotoxicity of this product. Further, the authors, in their paper have mentioned the available evidence on the genotoxic properties of betelnut and catechu (thus) explains the elevated SCE and CA frequencies observed in the present study. Another study on pan masala was conducted at the Ear, Nose and Throat (ENT) Department of Post-graduate Institute of Medical Sciences (PGIMS) in Chandigarh. In this study, the researchers made a paste of pan masala and applied it to the oral mucosa of rats on alternate days for 6 months. After 2 months, three rats out of 21 studied showed an increase in parakeratosis (abnormal growth of corneal layer of epidermis). The basal cells became more prominent. Also observed was a condensation of collagen bundles in these cells. These changes became more marked after 4 months. After 6 months the changes observed in the majority of rats of the group painted with the paste of pan masala, more than one precancerous signs and also sign of submucosal fibrosis. They were prompted to conduct this study in view of recent sudden 10 per cent increase in the number of patients with submucosal fibrosis. Bali (1989) has reported the results of the survey conducted on the incidence of oral lesions in the population consuming pan masala. In this study, three categories of pan masala users namely; light, intermediate and heavy users and variable ways of consumption namely; swallowers, retainers in the mouth and spitters, were investigated.

Table - 3

Constituents of Arecanut (per 100g.)

<u>Nutrients</u>	
Protein	5-9 g.
Carbohydrates	47-84 g.
Minerals	: Calcium, Phosphorus, Iron.
Vitamins	: Carotene.
<u>Non-nutrients</u>	
Tannins	11-26 mg.
* Alkaloids	150-670 mg.

\* Alkaloids in Arecanut include Arecoline (N-methyl guvacine methylester), Arecaine (N-methyl guvacine). C



1 dose : Cholinergic, Sialogogue and Diaphoretic.

2 dose : CNS depressant, affects dental enamel.

Observations can be summarized as follows :

Hyperplastic dysplastic and cancerous conditions are in the intermediate and heavy users

These conditions were quite common in those who chewed or retained in the mouth as compared to

Pan masala chewed along with betel quid showed higher incidence than pan masala taken singly.

While arriving at a definite conclusion on the above, the following points have to be borne in mind

Parakeratosis and parakeratosis are non-specific in response to any irritation. However, loss of nuclear polarity is suggestive of possible neoplastic change. At this situation may be seen in severe cases of leukoplakia.

The absence of any significant increase in mitotic index rules out an obvious neoplastic change.

Table - 4.

COMPOSITION OF CATECHU	%
Moisture	12.5 - 12.9
Tannin	57.3 - 59.1
Chin	14.2 - 17.2
Extractives (non tannin)	24.4 - 26.5
Water soluble matter	3.6 - 4.2
	1.4 - 1.6

Wealth of India. Vol. I, 1948, p. 10.

## STUDIES

From the studies mentioned above, it can be surmised that pan masala can cause oral cancer perhaps due to its constituents arecanut and catechu. These studies do not however indicate that use of pan masala has greater incidence of cancer than the betel quid chewers.

Recently mutagenicity studies (Ames test) using

personas communication). It was observed that in both the strains aqueous extracts were mutagenic.

Yet another point of interest is whether sweet pan masala which contain saccharin can further complicate the issue. Saccharin is reported to induce urinary bladder cancer. Commenting on the use of saccharin, IARC's monograph says "There is a small increase in the risk of urinary bladder cancer in general population consuming high doses of saccharin. However, epidemiological data provide no clear evidence that saccharin causes urinary bladder cancer. There are no epidemiological studies as to a positive association between use of saccharin and cancer at other sites in humans.

Now the two questions, whether pan masala has more potential as a carcinogen than arecanut and whether pan masala containing saccharin have further increased potential has to be established. These can be investigated by various short term studies used in assessing carcinogenicity by comparing the effects of known carcinogen in the arecanut namely, arecoline to different products in pan masala. Further, the pan masala once equated to the arecoline content can be tested with and without saccharin for its potential as a carcinogen.

## Recommended measures

The young population should be made aware of the potential dangers of use of tobacco, arecanut (supari) and pan masala. This has been achieved in case of smoking in developed countries, where the younger population has reduced smoking considerably. A statutory warning similar to that on the cigarettes can be put on the sachets of pan masala. The warning can also stress on the upper limits of consumption (4 g which is equivalent to one sachet of pan masala). The industry can take a technological challenge to manufacture pan masala without arecanut. It will be meritorious if a technology is developed to make arecanuts devoid of arecoline. This has been achieved in case of decaffeinated coffee. Arecanuts without or at least with low levels of arecoline can be attempted to be developed by genetic engineering. Banning the sale of pan masala is not the solution to the problem. This will have its own repercussions similar to that of drug addiction. Once the product is banned, not only the prices will shoot up in the underground trade but also the quality of the product will deteriorate with more deleterious effects on health. In the present situation creating awareness among the people appears to be the best solution.



STATEMENT ABOUT "FOOD DIGEST"  
FORM IV

Under Rule 8 of the Registration of Newspapers (Central Rules 1956 )  
(See Rule 8)

- |  |   |  |
|--|---|--|
| 1. Place of Publication  | : | MYSORE   |
| 2. Periodicity of its publication  | : | Quarterly  |
| 3. Printer's Name  | : | Director, CFTRI, Mysore  |
| Nationality  | : | INDIAN   |
| Address  | : | DIRECTOR<br>CENTRAL FOOD TECHNOLOGICAL<br>RESEARCH INSTITUTE<br>MYSORE - 570013. |
| 4. Publisher's Name  | : | Director, CFTRI, Mysore.   |
| Nationality  | : | INDIAN   |
| Address  | : | DIRECTOR<br>CENTRAL FOOD TECHNOLOGICAL<br>RESEARCH INSTITUTE<br>MYSORE 570013.   |
| 5. Editor's Name   | : | K.A.RANGANATH  |
| Nationality  | : | INDIAN   |
| Address  | : | CENTRAL FOOD TECHNOLOGICAL<br>RESEARCH INSTITUTE<br>MYSORE 570013                |
| 6. Name and address of individuals<br>who own the newspaper and<br>partners or shareholders<br>holding more than one percent of<br>the total capital | : | DIRECTOR<br>CENTRAL FOOD TECHNOLOGICAL<br>RESEARCH INSTITUTE<br>MYSORE 570013.   |

I, B.L.Amla hereby declare that the particulars given above are true to the best of my knowledge and belief.

B.L.AMLA  
PUBLISHER



## SU Index INDEX

Alcohol damaged grains 6

BIS J & K office 55

Britannia Industries

BSN Groupe expertise 57

Caffeine tea waste 8

Cans beverage lacquering  
machine 29

Cashew export 45

Cassava grinder 26

Chewing pan 62

Chiller vegetables 3

Chipper tapioca 32

Cool storage fruits/  
vegetables 1

Corn sheller mobile 30

Cut-fruit sale, hygienic  
conditions 63

DGTD information centre 56

Dough mixer 23

Doughnut machine 35

Drier

Vacuum type 19

Tray type 16-17

Drying system, low  
temperature 18

Export

cashew 45

groundnut meal 48

marine products 50

oilseed, extraction 46

onion 52

rice inspection 53

sesame seed 47

silver pomfret allowed 51

soyameal 49

spices 44

Fat production 42

Food storage bag 2

Foods processed  
production 43

Form-fill-seal machine 13

Fruit mill 28

Fruits production 39

Fruits, yeast coating 4

Fruits/vegetables  
cool storage 1

Fungi oil edible 7

Grain

cleaner 33

grinder 26

Grains damaged alcohol  
production 6

Grinder cassava/grain 26

Groundnut meal export 48

Indian standards food 59

Insect trap scent  
natural 5

Italian co-operation, food  
processing sector 54

Kneading machine 22

Lacquering machine, cans 29

Liquid filling system 10

Marine products export 50

Mineral oil food articles 61

Mixer-cum-kneader double  
arm 24-25

Moisture analyser, micro-  
processor controlled 38

Mustard oil vanaspati 60

Oil

edible, fungi 7

solvent extracted, amendment  
order 58

Oil production 42

Oilseed extraction export 46

Oilseeds production 41

Onion export 52

Packaging materials

consumption 36

Peeling machine 34

Plastic biodegradable  
potato waste 9

Potato waste

biodegradable plastic 9

Powder filling machine 11

Production

fat 42

foods processed 43

fruits 39

oil 42

oilseeds 41

vegetables 40



Reliable foods establishment 65  
Rice inspection, export 53  
Round container  
    sealing machine 12  
  
Salt analyser 37  
Sesame seed export 47  
Silver pomfret export  
    allowed 51  
Soyameal export 49  
Spices export 44  
Storage bag, food 2  
Strip packing machine 15  
Sweet making machine 21  
  
Tapioca chipper 32  
Tea waste caffeine 8  
Tray drier 16-17

Vacuum drier 19-20  
Vacuum drier, double-  
    cone 20  
Vanaspati mustard oil 60  
Vegetable seed extractor 31  
Vegetables  
    chiller 3  
    production 40  
    yeast coating 4  
Vertical plate freezer 27  
  
Weighing and packaging  
    system food 14  
Women pregnant  
    energy food 64  
  
Yeast coating  
    vegetables and fruits 4



# LIST OF CFTRI PUBLICATIONS

## BOOKS

	...	Rs. P
1. Home Scale Processing & Preservation of Fruits and Vegetables(1977)	...	10.00
2. Balanced Diets & Nutritive Value of Some Common Recipes (1972)	(English) ... (Kannada) ...	15.00 6.00
3. Banana in India(1989)	...	30.00
4. Pineapple: An Industrial Profile(1985)	...	15.00
5. Pepper: A Profile(1985)	...	15.00
6. Papaya in India(1987)	...	20.00
7. Grapes in India(1988)	...	20.00
8. Traditional Foods: Some Products and Technologies(1986)	...	150.00
9. Biotechnology and Utilization of Algae the Indian Experience(1986)	...	150.00
10. R&D at the CFTRI Three Decades 1951-1980 (1982)	...	100.00
11. Status of Research on Leaf Protein and Microalgae in India(1982)	...	50.00
12. Mandarin Orange in India	...	30.00
13. Mango: An Industrial Profile		(In Press)

## DIRECTORIES

1. Directory of Indian Food Machinery and Packaging Equipments(1987)	...	100.00
2. Directory of On-going Projects in Food Science & Technology and Related Areas in India(1986)	...	70.00

## ANNOTATED BIBLIOGRAPHIES

1. Aseptic Packaging (1983-85)	...	50.00
2. Cassava (1977-86)	...	50.00
3. Cassava Starch (1977-86)	...	50.00
4. Cocoa Flavour and Aroma	...	50.00
5. Cultured Milk (1977-86)(10 Volumes)	Per Vol. ...	50.00
6. Energy Conservation in Food and Allied Industries (14 parts)	Per Part ...	50.00
7. Ethanol Production (1976-86)	...	50.00
8. Extruded Food and Machinery (1968-86) 4 Vol.	Per Vol. ...	50.00
9. Food Grains (Publications of CFTRI and DFRL, Mysore)	...	50.00
10. Fumaric acid (1969-1988)	...	50.00
11. Indian Sweets (1969-87)	...	25.00
12. Instant Noodles (1970-85)	...	50.00
13. Khoa (1969-87)	...	50.00
14. Lemon Juice (1978-87)	...	50.00
15. Lemon Oils (1978-87)	...	50.00
16. Lemon Pectin (1978-87)	...	50.00
17. Papad (1969-87)	...	50.00
18. Pomegranate (1969-1987)	...	50.00
19. Potato Starch (1977-86)	...	50.00
20. Rice and Wheat Quality (World Literature) 1987	...	50.00
(Rice Quality 1909-86; Wheat Quality 1975-86)	...	50.00
21. Rice Bran and Rice Bran Oil 1970-80 (1983)	...	50.00
22. Tamarind Gums (1969-87)	...	50.00

## PERIODICALS

	Annual Subscription	Indian	Foreign
		Rs. P	US\$
1. Food Technology Abstracts (Monthly)	...	250.00	85.00
2. Food Digest (Quarterly)	...	150.00	65.00
3. Food Patents (Quarterly)	...	100.00	50.00

Postage is Extra

For Copies Write to:

The Area Co-ordinator, FOSTIS, CFTRI, Mysore - 570 013, Karnataka



Regd. No. 36762/84

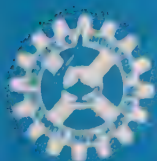
Printed and published by Dr.B.L.Amla, Director, Central Food Technological  
Research Institute, Mysore 570 013, at CFTRI Printing Press.  
Editor: Shri K.A.Ranganath, CFTRI, Mysore.



Vol.13 No.2  
April - June 1990

ISSN 0253 - 4908

# food DIGEST



Central Food Technological  
Research Institute, Mysore,  
CSIR, India.



National Information System  
for Science and Technology  
Department of Scientific and  
Industrial Research, New Delhi



## SDI SERVICES FROM NICFOS

A few years back a survey was conducted among users of our services regarding their option for the selective dissemination of information (SDI) in the area of Food Science and Technology. The survey indicated a need for the above type of service. Recently we have started this new service with the installation of computer facility at our centre.

In SDI service we are supplying specific information needed by the users on the relevant topic of their interest based on keywords supplied by them. The SDI service is provided by searching the current tapes of the FSTA database produced by the International Food Information Service. The relevant abstracts obtained based on the profile through the computer printout will be mailed regularly. There is also scope for to alter the profile consequent to the receipt of our printout knowing the relevance or otherwise of the abstracts supplied. We are sending the printouts on trial basis for two months. If you find this service useful you can start subscription for regular SDI service.

We request you to send your profile in the prescribed form available with us

*For profile form, please contact :*

*The Area Co-ordinator*

*FOSTIS, CFTRI*

*Mysore - 570 013, India*

## FOR PHOTOCOPY (XEROX) OF PUBLISHED SCIENTIFIC/TECHNICAL ARTICLES PLEASE CONTACT US

The National Information Centre for Food Science and Technology (NICFOS) at the Central Food Technological Research Institute, Mysore, has got a good collection of scientific and other periodicals collected over the years in the area of Biological Sciences. If any article is needed for reference work, we will supply one copy from our wealth of collections. The cost of providing the copies is Rs.2/- per page (minimum charge Rs. 10.00). Please take advantage of this facility to overcome your problem in getting original articles.

*Please Contact : The Area Co-ordinator*

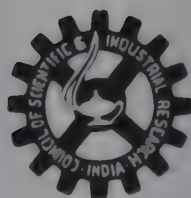
*FOSTIS, CFTRI,*

*Mysore 570 013, India.*



# FOOD DIGEST

Vol.13 No.2  
April - June 1990



National Information Centre for Food Science and Technology  
Central Food Technological Research Institute,  
Mysore - 570 013, India



Annual Subscription: Rs. 150.00, US \$ 65.00, Single copy: Rs.40.00



# CONTENTS

1. Raw Materials	....	45
2. Storage and Infestation Control	....	46
3. Food Additives	....	48
4. Processes	....	50
5. Byproducts and Waste Utilization	....	52
6. Processed Products	....	-
7. Equipment and Machinery	....	53
8. Packaging	....	63
9. Analysis	....	64
10. Commercial Intelligence	....	65
11. Food Regulation, Quality Control & Hygiene	....	86
12. Transfer of Technology & New Industries	....	89
13. Personalia	....	-
14. Special Article	....	92
Nutritional Aspects of Plam Oil		

Index





## Raw Materials

### 56 Grape seed oil

Grape seed oil is a by-product of the wine industry. The oil has been used for generation in the Mediterranean countries and is now getting popular in USA as a cooking oil. The oil is extracted from wine grape seeds. After the grapes are pressed to harvest the juice, the seeds, leaves and stems remain. Grapeseed oil manufacturers separate the seeds, then dry them, heat them and press the oil. It takes 1000 pounds of wine grapes to manufacture 4 lbs of grapeseed oil.

It is reported that grapeseed oil has one of the lowest saturated fat levels in the cooking oil market and contains more linoleic acid than any other cooking oil. Tests on the oil has shown that it contains 77% or more linoleic acid.

The wine industry in India is coming up fast in Goa, Karnataka, Maharashtra. However, our grape industry is not aware of the significance of grapeseed oil. The grape seeds are going to waste at present. Indian entrepreneurs should look at this waste for the production of grapeseed oil for consumption by the affluent health-conscious section in urban India.  
(Journal of the American Oil Chemists Society 66(8), 1989, 1043)

### 67 Indian flea seeds against cholesterol

An obscure little town of farmers in Gujarat is warming up for a bumper crop. A nondescript household remedy for stomach disorders long known in India, flea seed, which is an exclusive produce of Sidhpur in the western Indian state, has become the subject of a national debate in the United States. And the answer to this debate could well be the answer to the global problem of heart disease.

Sidhpur has a near-monopoly on the world's supply of flea seed, also known as flea wort, or psyllium; a tiny, tasteless, obscure seed that, according to early research, may reduce cholesterol levels in the blood.

Ever since the link with cholesterol was disclosed, psyllium has been an increasingly popular ingredient of breakfast cereal in the United States. If further research proves the seed's benefits, this dusty farm district could become the epicenter of a health-food fad.

"This seed is not grown anywhere else in India, or anywhere in the world", according to T.V. Krishnamurthy, a vice president of Procter and Gamble India, a major psyllium buyer and exporter. "The proper climatic conditions do not exist in many places in the world".



Arvind Patel, a processor and exporter of the seed, says: "If psyllium takes the place of oat bran, we will need huge quantities of it from Sidhpur".

This outcome, however, will depend on further research and trials and approval of monitoring organizations like the U.S. Food and Drug Administration (FDA). But one thing is certain: psyllium will be solely an export item from Sidhpur for a long time! Local farmers say it is as good a cash crop as mustard, but they have no desire to eat a bowl of psyllium every morning - cholesterol phobia has not yet reached rural India.

For decades, psyllium husk has also been the main ingredient in such laxatives as Procter and Gamble's Metamucil, a top-selling brand in the United States, and CIBA-GEIGY's Fiberall. But after researchers recently discovered that soluble fibers also lower cholesterol levels in the blood, Cincinnati-based Procter and Gamble ordered studies on psyllium versus cholesterol.

One of the studies done at the University of Minnesota tested 75 people with raised cholesterol levels. After 18 weeks, the group that took three teaspoons of Metamucil daily saw a significant dip in their general cholesterol levels, and even larger reduction in levels of low-density lipoproteins, the "bad" cholesterol.  
(Science Update December 1989, 10-11)

## Storage and Infestation Control

### 68 Zinc chloride keeps fruit fresh

A dip in a zinc chloride solution can slow browning of cut apples, pears and peaches according to researchers at the Agriculture Dept's Western Regional Research Centre (Albany CA). The laboratory researchers note that browning is caused by polyphenol oxidase enzyme released from the fruit's cells when it is cut. The treatment delays browning - for several days - upto 10-weeks or more - of sliced fruit that has been bagged and refrigerated.  
(Chemical Weekly 35(28), 1990, 8)

### 69 Vapour treatment of fruits

The Plant Quarantine Division of the Philippine Bureau of Plant Industry has developed a process of using steam vapour treatment in the quarantine of fruits for export. The process involves vapour treatment of fruits in a vapour treatment chamber at a temperature of 46 C to kill pests. Exposure time depends on the type of fruit: mangoes are exposed for one hour 40 minutes and papayas for two hours. A humidity of 50% to 70% is required. The treated fruits are then cooled for 30 minutes under a cold water shower. The vapour treatment provides a longer shelf-life to fruits and prevents occurrence of post-harvest diseases.



For details, contact: Ma. Salome B. Del Rosario, Post Entry Plant Quarantine, Bureau of Plant Industry, San Andres, Malate, Metro Manila, Philippines  
(Asia-Pacific Tech Monitor September-October 1989, 26)

## 70 High pressure processing of foods for improved shelf life

High pressures (3000-5000 bar) can kill bacteria, viruses and spores, and control enzyme reactions, extending the shelf life of many foods. The biggest advantage of pressure treating over heating is that food retains, its original flavour and vitamins, which can be destroyed by heat. In addition pressure treatment can aid on the crystallisation, purification and separation of useful materials, reports Akinori Nogirchi, chief of the Food Engineering Laboratory with the Japanese Ministry of Agriculture, Forestry and Fishery.

MAFF has recently started a research consortium of 21 private companies to promote the commercialisation of high-pressure processing of such foods as eggs, honey, dairy products, meat and fish. Pressure treating is done in a cold isostatic press to which temperature control is added. High pressure is produced by a hydraulic pump. Most processing is done at room temperature, but in some cases higher temperatures may be used to enhance the effects of the high pressures.  
(Chemical Weekly 35(30), 1990, 106-107)

## 71 Preservation of frozen fish by ascorbic acid

The shelf-life of frozen fish may be extended for several months by a treatment with ascorbic acid, which can be applied by either dipping or spraying at a level of 0.5-3%. To ensure an even and sufficiently thick coating, a thickening agent should be added to solution.

For shrimp and prawns, a combination of citric acid and ascorbic acid shows the best result (0.5% ascorbic acid + 0.5% citric). Here also a thickening agent will improve the preservative action.  
(Chemical Weekly 35(22), 1990, 87)

## 72 Inert dust protects stored groundnut

A cheap and inert clay dust called ABCD, developed at the Indian Institute of Chemical Technology (IICT), Hyderabad, can help protect groundnut pods and peas from three species of storage pests.

Studies at the International Crop Research Institute for Semi-Arid Tropics suggest that the clay might help replace expensive and hazardous insecticides and fumigants.



Data from dusted and non-dusted seeds and pods suggest that the dust has a marked effect on the ability of insects to survive and reproduce. Two species, *C.cephalonica* and *T.castaneum*, were dead within 80 days after the seeds were treated.

Reporting their findings in an ICRISAT publication, researchers S.Mittal and J.A.Wightman said scientists in countries where groundnut is grown and stored in farms or large warehouses should evaluate the data on a larger scale in view of the potential use of the cheap dust.

Another ICRISAT study has shown that the presence of neem cake and *Ipomoea* mulches results in low levels of termites as these substances act as repellent barriers between the soil and groundnut pods.

(P.T.I. Science Service 9(5), 1990, 1)

## Food Additives

### 73 Acetaldehyde as a natural flavour additive

There is a growing interest in producing acetaldehyde from a natural source for use as a natural flavour additive. Acetaldehyde contributes to the freshness, fruitiness and/or nuttiness of a great number of food systems including fruits, fruit juices, dairy products, alcoholic beverages, vegetables, spices, meats, bread, eggs and candies. Acetaldehyde also has potential uses in the post harvest storage and ripening of fruits. Because of the high volatility and reactivity of acetaldehyde, dry acetaldehyde delivery systems are currently being developed.

A novel approach to the microbial conversion of simple sugars to acetaldehyde for use as a natural flavour additive has recently been developed by Prof. Zall of Cornell University. In this method the non toxic bacterium *Zymomonas mobilis* is diverted from ethanol production to the production of acetaldehyde. This is accomplished by selecting mutants of *Z.mobilis* that are deficient in alcohol dehydrogenase, an enzyme which normally is responsible for the conversion of acetaldehyde to ethanol. When an alcohol dehydrogenase deficient strain of *Z.mobilis* was grown in a culture medium containing 4% glucose, nearly 40% of the theoretical yield of acetaldehyde was obtained based upon the amount of glucose consumed.

This new biotech method claims several advantages:

1. The method produces acetaldehyde suitable for use as a natural flavouring agent.
2. The yield of acetaldehyde obtained with this approach represents the highest yield published to date for the biological production of acetaldehyde.



3. The production method uses glucose, sucrose and/or fructose as inexpensive starch materials. This should prove more cost effective than earlier methods which produce acetaldehyde from ethanol. It may be applicable to residual or waste sources of sugars.

4. Neither enzyme nor catalysts are used in the process of eliminating the costs associated with producing acetaldehyde by such means.

5. The acetaldehyde produced was separated from solution by sparging the culture with air. The acetaldehyde was then collected from the air stream. This method of product separation from the reaction vessel lends itself well of both batch production and continuous production of acetaldehyde.

If the new process is commercialized, even higher yields are feasible given the likelihood of the following developments. (a) optimization of such reaction conditions as feed sugar concentration, temperature, pH and oxygen delivery rate; (b) maximizing the separation and trapping conditions for the acetaldehyde; and (c) immobilization of the bacteria and continuous fermentation.

The transfer of this promising technology for industrial utilization is contingent on the successful scaling up of culture conditions and on the retrieval of the acetaldehyde in a manner optimal for flavour use. A patent application has been filed covering this novel approach to the microbial production of natural acetaldehyde.

(Chemical Weekly 35(28), 1990, 98-99)

#### 74 Food additives and their categories

Food additives have long been associated the world over with consumer concerns. The latest definition of a Food Additive as defined by the EEC in Europe is very precise and covers all its aspects. 'Food additives means any substance not normally consumed as a food in itself, and not normally used as a characteristic ingredient of food whether or not it has nutritive value, the intentional addition of which to food for a technological purpose in the manufacture, processing, preparation, treatment, packaging, transport or storage of such food results or may be reasonably expected to result, in it or its by-products becoming directly or indirectly a component of such foods'

The major categories of food additives in advanced countries are:

- Colour, anti-oxidant emulsifying salt, gelling agent, flavour enhancer, acidity regulator, modified starch, raising agent, glazing agent, firming agent, sequestrant, bulking agent, preservative, emulsifier, thickener, stabilizer acid, anti-caking agent, sweetener, antifoaming agent, flour treatment agent, humectant, enzyme, propellant/packaging gas.

(Chemical Weekly 35(28), 1990 97)



## Processes

### 75 Removal of cholesterol from dairy products

About 95% of the cholesterol could be removed from butter and a little less from milk and cream, by a process being developed at the University of California. The technique is reported to be relatively simple, reports Thomas Richardson, Professor of dairy food science in the Department of Food Science and Technology.

Food grade saponins are stirred into the product and form an insoluble complex with the cholesterol. The complex is then filtered out, using a filter such as diatomaceous earth. The researchers working under Dr. Richardson have tested the process on the I-L scale and reports it could be easily scaled up, using conventional dairy equipment. A number of dairy companies in USA have shown interest in the commercialisation of the process for producing healthy cholesterol-free dairy products.

(Chemical Weekly 35(30), 1990, 105)

### 76 New process for vanaspati

A new process to produce cheaper and hygienic vanaspati in just half the time presently taken by vanaspati factories all over the world has been developed by Dr. R. Rank, an eminent Indian molecular scientist. The process developed by him produced vanaspati which was seven and half times more hygienic and cheaper by 35 per cent.

(The Oils and Oilseeds Journal 42(1-3), 1989, 90)

### 77 Liquid roasting of cocoa beans

Of the various techniques developed for roasting of cocoa, the future for cocoa lies in liquid roasting.

In general, the process of roasting consists of the formation of the aromatic fraction of cocoa, through activation of chemical reactions and physical phenomena. In non-liquid roasting, a continuous development of steam leads to an uncontrolled loss of some of the already formed aromatic substances. This is why liquid roasting is more beneficial for cocoa manufactures.

Because the presence of a great amount of humidity prevents the formation of pyrazine derivatives, it is important that the roasting process be preceded by a suitable drying phase at limited temperatures (Max. 100 °C).

Adopting the process of liquid roasting technology involves obtaining raw masses, that is to say, unroasted cocoa which has just been dried and still contains at least 4-5% humidity.



In order for the aromatic fraction of cocoa to properly develop to the required level, it is necessary that the roasting process occurs under conditions which are as precise and repeatable as possible (particularly in regard to the roasting time). Respecting these conditions ensures optional roasting.

For further information contact: Carle and Montanarium, Milan, Italy.

(Chemical Weekly 35(26), 1990, 101)

## 8 Mass production of omelettes

A group of French companies has built a completely automated system for cooking omelettes by induction heating.

A mixture of egg white and yolks from a breaking machine is stored in 1000-litre containers and is pumped to a funnel. The product passes into a double-walled, water-cooled heat exchanger, with surface scrapers, where it is pasteurised at 68°. It then passes into a feed tank with four nozzles located immediately above the cooling line.

The cooking tunnel is 18 metres long and is fitted with 11 sets of induction heaters: two for pre-heating, nine for heating totalling about 1000 spiral-wound induction heaters with 600 pans welded on beams. The pans are pre-heated for 15-18 seconds to heat the mixture of oils to 180° before the egg mixture is added.

The pans enter the oven in rows of four where the omelettes are heated to 80° for two minutes. During the cooking process, an electric generator produces steam to keep them moist. The average production rate is 6250 omelettes an hour.

When cooking is complete, the omelettes move into an initial cooling tunnel where they reach a temperature of 16° after four minutes. Then they move to the automatic folder and are then cooled once again for six-seven minutes to produce a core temperature of 2°. The omelettes are then packed in sets of ten in film-covered trays in a carbon dioxide and nitrogen atmosphere.

While the rapidly produced omelettes can be consumed directly, some of the other features include an excellent thermal output of the order of 80 percent, much greater than conventional ovens (20 percent), uniformity and fine control of temperature, presenting an unbroken surface, improving production hygiene and no environmental pollution.

(P.T.I. Science Service 9(5), 1990)



## Byproducts and Waste Utilization

### 79 Anti-cholesterol compound from sugarcane

Cuban scientists have recently unveiled a new compound called PPG that reduces the cholesterol level in the blood and is derived from sugarcane.

During a recent symposium in Dec. 1989, the Cuban scientist Julian Rodriguez of the National Centre for Scientific Investigation (CNIC) reported that PPG is a completely harmless compound of natural origin made up of various sugarcane sub-products. Since 1987, Cuban researchers have carried out many tests and studies on different animals. Recently, they had also been able to carry out pre clinical tests on humans with positive results. PPG has also been shown to reduce arterial hypertension.

(Chemical Weekly 35(28), 1990, 98)

### 80 Soft drink from waste whey

Whey, a waste product of the dairy industry, might soon be converted into a tasty soft drink through a new process developed by undergraduate chemical engineers at the Indian Institute of Technology (IIT) in New Delhi.

The process developed by students S. Bhatt and S.K. Goel working under Professor B.K. Guha at the department of chemical engineering involves the fermentation of whey with the bacterium Lactobacillus acidophilus.

The researchers believe that several million litres of whey churned out as a waste product by dairy industries across the country are currently being discarded as waste. Whey has a high biological oxygen demand (BOD) associated with it and when discarded without special treatment, it adds to pollution. But treatment processes for whey are energy-intensive and expensive.

In the new process, whey is converted into a drinkable product by fermentation to convert part of the lactose content of whey to lactic acid. The process involves inoculating whey obtained from pasteurized milk, with the therapeutically useful bacillium. Lactobacillus acidophilus, at 35 C. The mixture is then left to ferment at 38 C.

In small scale laboratory tests, the fermentation occurred fast, the reaction completing within six hours. However with lower microbial mass, the reaction time is expected to increase and side reactions will be minimised.



The fermented product at a desired acidity gave a flavour and taste of lassi, the scientists said. The process could be used to produce synthetic lassi and flavouring agents could be introduced into the drink to improve the taste, they said.  
(P.T.I. Science Service 9(3), 1990, 2)

### 1 Xylitol from straw

Surplus steam, from a power station, and surplus straw from arable farming have been combined to yield a highly saleable commercial sweetener, xylitol in a research project carried out by the Danish Institute of Biotechnology in collaboration with a Jutland power company.

The process can also be used to extract sweetener from deciduous tree wastes, although most of the research to date has concentrated upon straw, simply because surplus straw is available in very large quantities. Laboratory-scale production has been able to extract between 67 and 90 kg of xylitol per tonne of straw.

The process involves three stages -- extraction, fermentation and purification. In addition to xylitol, the process yields 90 kg molasses, 7 kg of yeast solution and 20 kg of plaster of Paris (calcium sulphate) per tonne of straw, as well as about 750 kg of extraction residue. The process uses 2 to 3 tonnes of steam (180-200 C) per tonne of straw.  
(Asia-Pacific Tech Monitor September-October 1989, 20)

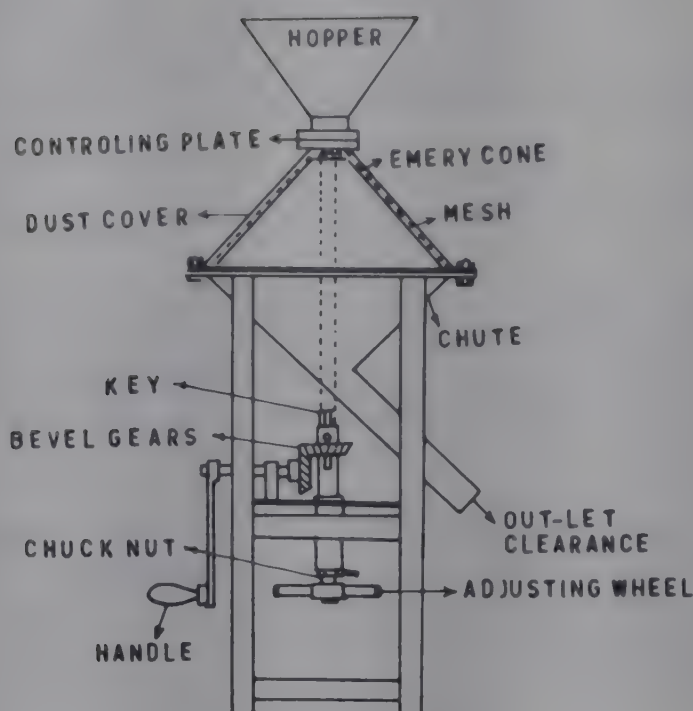
### 2 Recycling fish waste

Refuse from fish factories can be a valuable nutrition for livestock. A British firm has designed a machine for converting heads, bones and offal into animal feed. The Fish Mutrator made by Mono Pumps Ltd can process 7 tons per hour with a 25 cm cutting head that pulverises the waste. Acid added to the slurry in a blending tank turns it into a nutritious silage that can be mixed with animal feed. The unit can be used on fishing trawlers too.  
(Asia-Pacific Tech Monitor September-October 1989, 22)

## Equipment and Machinery

### 33 Pulse dehusking machine for rural use

A simple hand-operated pulse dehusking machine has been developed for small scale rural processors. Consisting of an emerycoated metal cone fixed to a vertical shaft and rotating inside a conical wire mesh screen, the unit is operated by a handle and bevel arrangement. A screw at the base of the shaft can raise or lower the cone. A dust cover with a hopper at top envelops the screen. Another hopper collects the mill stream which comes out through a chute. As in traditional techniques, the husk of bold grains like



Bengal gram and tur are loosened by soaking in water and sun drying. After milling in the machine, the dhal is separated by winnowing and sieving as in traditional process. Dhals, in yields of 75-80 per cent from Bengal gram and tur have been obtained. The cost of a unit is calculated to be about Rs. 3,500/-

(Research and Industry 34(3), 1989, 213-216)

#### 84 Pulse dehuller-cum-splitter

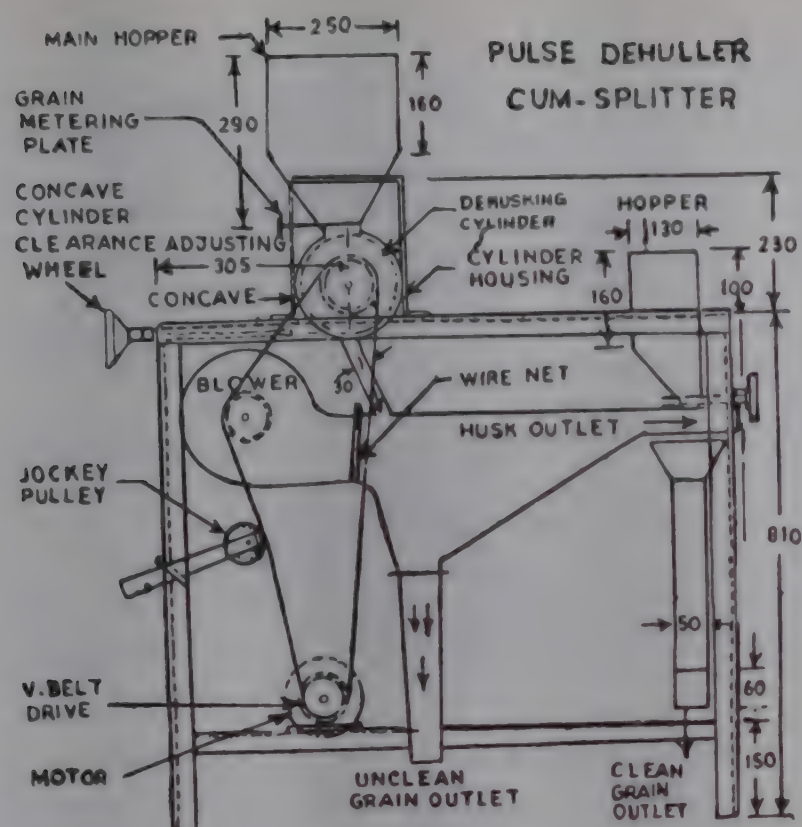
Pulses are leguminous crops rich in protein. The protein content of pulses varies from 20 to 40%. Pulses form the cheapest source of supplementary protein in Indian diet.

A small capacity, low cost, simple and portable pulse dehuller-cum-splitter has been developed.

##### Mechanism

The machine consists of a cylinder-concave set, a feed hopper and a blower, as shown in the sketch. All these parts are fitted on a 25x25x6 mm mild-steel angle-iron frame of 915x470x810 mm size. Two mild-steel cylinders were fabricated, each 150 mm round and 225 mm long. The outer surface of the cylinders was made rough by coating with commercially available 36-mesh emery cloth, knurling and serrations. A concave made of 3 mm thick mild-steel plate having the same curvature as the cylinder and with 1x1 mm (widthxdepth) grooves along its length spaced 25 mm apart is provided below the cylinder. The concave covers about 1/4th of the circumference of the cylinder, the rest of which is covered with 18-gauge mild-steel sheet. The clearance between the cylinder and the concave is adjustable by forward and backward movement of the concave.





To facilitate separation of hull from the mixture of dal, unhusked pulse and husk, a blower with duct is provided with the machine.

For details contact: D.V.K. Samuel, Division of Agricultural Engineering, Indian Agricultural Research Institute, New Delhi - 110 012.

(Invention Intelligence, February 1990, 88-89)

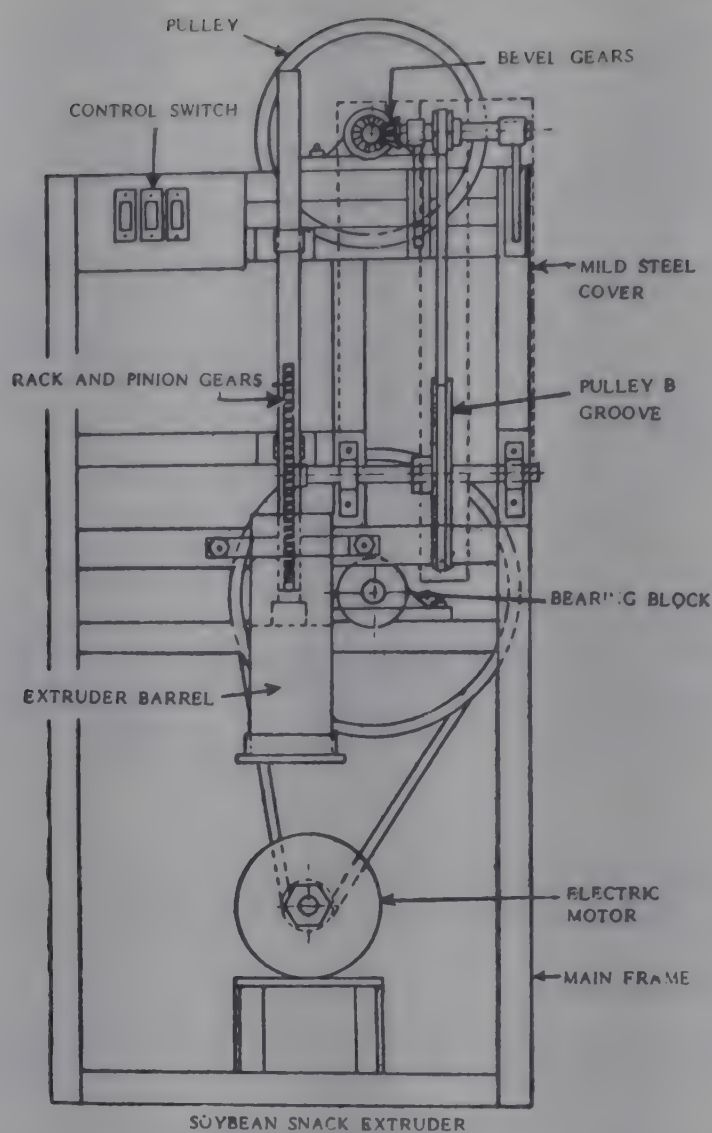
## 35 Soybean snack extruder

Scientists at the Central Institute of Agricultural Engineering, Bhopal, have developed and evaluated an extruder for making different snacks. Due to problems of digestibility and flavour, soybean is not utilized for multiple snacks. On the other hand, Indians do prefer snacks made from rich and sago palm (rich in starch). So, by mixing soyflour with the flour of rice and sago palm the total protein content could be increased.

Preparation of baked products (bread, cake, biscuits, etc) from soyblend slurry of soybean, rice and sago palm needs an extruder. The machines used for this purpose at present are not suitable or up to the mark and lead to drudgery.

The overall dimensions of the machine are 1,200x680x510 mm (see sketch) and it weighs about 62 kg. It requires a 370 w motor and one operator. Its cost, including electric motor, comes to Rs. 3,200.

Soybean of good quality is cleaned and milled in a burr-mill to prepare soydal. The flours of soydal, rice and sago are mixed in desired proportion. Water is added to it at the rate of 400 ml, for 100 gm blended flour.



The salt, cumin, etc are mixed to it and the slurry cooked in a vessel for 1.5 minutes to make it a thick pasty substance. After cooling down, the paste is ready for extrusion.

The soyblend slurry is placed inside the barrel. The piston moves with a speed of 0.7-1.0 cm/second from top to bottom. By pressing the slurry it extrudes the snacks through the die. The extruder barrel is 75 mm in diameter and 280 mm in length. The die (of different size or shape) can be changed according to consumers' demand. Generally, the die used for this is 0.5 mm thick and 5.00 mm in diameter. About 1 kg cooked material (slurry) can be fed into the barrel at a time.

The capacity of this equipment is about 34 kg/hr, whereas that of hand-press machine is only 1.5-2 kg. The cost of extrusion of 1 kg cooked material comes to Re.0.30 only. The instant snacks prepared by this equipment were liked in experimental trials. It is now ready for large scale popularization among soybean growing farmers. (Invention Intelligence, February 1990, 56-57)

## 86 Twin roll decorticator for sunflowerseed

Double drum huller is generally used for high capacity hulling, i.e. if the capacity of hulling required is more than one ton per hour. A centrifugal type impact huller can be used if the capacity required is less than 500 kg/hr. The double drum huller is usually



preferred over centrifugal disc type impact huller in case the capacity of huller required exceeds 500 kg/hr.

The undecorticated seeds are uniformly fed to the two stage roll crusher through rotary feeder.

The hulling unit consists of upper and lower twin rolls, each set of rolls rotating in opposite direction at differential speed. The roll diameter will be within 200 to 300 mm depending upon the capacity of machine and geometry of seeds to be dehulled. The length of roll would be within 500 to 700 mm. The roll will rotate in the range of 750 to 1000 rpm and the low speed one will rotate in the range of 400 to 750 rpm. The differential speed of rolls help in pulling down the seeds through the cracker which is required to ensure downward movement of the seeds through cracker. It may be noted that the rolls are corrugated at the surface.

The material is fed through the sharp edge of the corrugation and cracked to decorticate the seeds. The distance between two rolls can be adjusted (one is fixed and another is adjustable one) by mechanical or hydraulic means according to the specified size of the final product.

Each set of rolls is driven by two separate motor. The proper design of corrugation would be of immense importance since it substantially effects the performance of hulling operations. Probable specifications of proposed huller will be as:-

Capacity of huller	-- 2 Ton/hr
Dehulled seeds	-- 95%
Fines	-- Less than 5%
Size	-- + 30 mesh
Residual oil in hull	-- less than 1%
Primary drive motor	-- 5-7.5 H.P. (2 motors)
Variable speed feeder motor	-- 1 HP
Roll diameter	-- 200 to 300 mm
Length of roll	-- 500 to 700 mm
Roll distance adjustment	-- Hydraulic/Pneumatic/ Mechanical

Interested members are requested to contact: Dr.N.C.F. Shah, Scientist-in-charge, Mechanical Engineering Research and Development Organisation, NCL Campus, Pashan Road, Pune-411 008.  
(SEA News Circular 3(15), 1990, 28-29)

## Groundnut decorticator

A special machine for use by small farmers as well as traders for shelling out groundnut seeds or kernels has been developed. The machine can be hand operated, or can be powered by a one horsepower AC electric motor of 230 V.

Throughput capacity of the machine is 50 kg/hour. Several models are already in operation in India, and some machines have been exported to Pakistan, the UK and Middle East countries, in cooper-



ation with the UN Food and Agriculture Organisation. The company also manufactures larger powered decorticators, agricultural implements, grinding mills and knife grinders amongst other things.

For details, contact: Dandekar Brothers, Shivajinagar, Sangli-416 416, Maharashtra, India.  
(Asia-Pacific Tech Monitor September-October 1989, 26-27)

## 88 The flow meters for the food processing industry

New flow meters for precision measuring of volume flows in hygienic applications for instance at dairies, breweries and elsewhere in the food processing industry has been developed by the Finnish company Koltek Oy, which through ownership by the Danish firm LKW now belongs to the Afa Laval Flow group of companies. Applications can also be found in the chemical and paper industries.

The meters in the new K11 series are each equipped with a detector for picking up and transmission of electronic pulses. Thanks to a standard three-wire coupling the meter can be used in connection with various industry-standard control systems and reading instruments. The pulses are generated by a permanent magnet mounted on the meter's rotating ring piston. The ring piston's rotation corresponds to a certain volume flow, and therefore the frequency of pulses is in direct proportion to the flow rate.

Because the pulse detector has no moving parts the meter is reliable, moisture-proof and easy to install. Output signals can be calibrated to various types of reading instruments. The flow can be measured in both flow directions, and the meter is installed either in a horizontal or a vertical position. The distance between the meter and the reading equipment can be up to 1,000 meter. The meters are suitable for liquids and suspensions within a viscosity range from 0.5 to 2,000 cP. They need not be disassembled for cleaning.

For further information please contact: Koltek Oy, Box 18, SF-01231, Vantaa, Finland.  
(Chemical Weekly 35(29), 1990, 101-102)

## 89 Evaporators

Alpen Evaporators are designed for liquid-liquid separation for recovery of one of the constituents or concentration of one constituent in a mixture of liquids. They find applications in the chemical, pharmaceutical, drug, food processing, sugar, fruit juice, vanaspati, and milk segments of the process industry. The models offered are: Calendria type, boiling pan/concentrator, agitated thin-film and falling film evaporator. They are offered in carbon and stainless steels in single and two stage versions, with operating temperatures up to 250 C and pressures up to 15 kg/sq cm (for steam heating), as also up to near-vacuum. Vapour-liquid separation, where required, is achieved through the use of demister pad when there is no possibility of fouling by solids in the liquor.



For more details write to: Alpha Process Engineers, 6 Park Avenue, K.P. Puram, Madras 600 028.  
(Chemical Products Finder 8(10), 1990, 127)

## 90 Rotary pouch sealing machine

Plasto Pack manufactures Rotary Pouch Sealing Machines suitable for sealing virgin as well as laminated pouches. These machines are compact, sturdy and can be accommodated in the packaging line of any industry. The pouches filled with products are kept on a conveyor which carries them to the sealing port where rotating rollers seal the pouches and then carry them away. Optionally grippers are provided to hold the pouch vertically for exact positioning at the sealing port. FHP motors drive the sealing rollers and conveyors. The speed of the conveyor and sealing port is synchronized with the speed regulator. Output from these machines vary from 1,000 to 1,500 pouches per hour depending on the thickness and nature of the pouch material. The machines are designed to operate either on 230 V or 110 V AC, and can be mounted on a table. The height between the sealing port and the conveyor can be easily adjusted to suit various pouch sizes. User areas include: pharmaceutical, chemical, food and engineering industries.

For further information write to: Plasto Pack B-15 Mugappair Industrial Estate (West), Madras 600 050.  
(Industrial Products Finder 18(6), 1990, 215)

## 91 Rotary type cup filling machine

Panpack Marketing offers an automatic rotary type cup filling machine for use in food and pharmaceutical industries. It can handle plastic cups of different sizes and shapes. The machine is ideally suited for filling ice cream and can also be used for jam, honey, oil, margarine, yoghurt, fruit juice, soft drinks, and cream.

For more details write to: Panpack Marketing, P.B. No.48, Panchal House, Near Municipality Office, Anand, Gujarat 388 001.  
(Chemical Products Finder 8(9), 1990, 127)

## 92 Bottle washing machine

Designed to clean bottles/vials of various types and sizes, the PSE rotary machine has four separate stations for inside jet wash. The stations can be connected to clean the containers with various washes like detergent, hot water, demineralised water and compressed air or distilled water. The machine has a facility for outside spray wash. It is provided with a panel board for operating mechanism and to control the temperature of hot water which can be maintained up to



60 C fitted with a heater of 6 kW. Suitable for cleaning various types of bottles from 15 to 750 ml, the machine is fitted with 0.5 HP 3-phase electric motor along with reduction gearbox for main drive. Output is 50-70 bottles a minute, depending on the size of the containers.

For more details write to: Pharmaceutical and Surgical Equipments, Zillawadi, Suren Road, Near Darpan Cinema, Andheri (East), Bombay 400 093.  
(Chemical Products Finder 8(8), 1990, 59)

### 93 Dehumidifier/air dryer

The Bry-Air compact dehumidifiers remove moisture from the air through a process of continuous physical adsorption. These are based on the concept of desiccant dehumidification where the desiccant can be continuously regenerated for an indefinite period and can maintain relative humidity at 1% or even lower. The equipment is available in 23 standard models with different drying capacities. The compact units come in 3 models - 50, 100 and 150 CFM. These models, being light in weight, can be mounted in different positions - floor, table-top, wall bracket and ceiling suspended. The Bry-Air dehumidifiers find applications for drying of seeds, milk, tea, coffee, packaging of biscuits, powdery foods, etc.

For more details write to: Arctic India Sales, 20 Rajpur Road, Delhi 110 054.  
(Chemical Products Finder 8(8), 1990, 69)

### 94 Low-cost tray dryer

A low-cost tray dryer using agricultural wastes as fuel, which can be utilised in small-scale food processing industries for drying products at controlled temperatures has been fabricated at the Central Institute of Agricultural Engineering (CIAE), Bhopal. The tray dryer basically consists of a drying chamber and plenum chamber which is covered with an asbestos sheet on the sides and wire mesh at the top. A burning-cum-heat exchanging unit is housed in the centre of the plenum chamber.

The burning chamber is a galvanised iron sheet cylinder fitted with six pins for transfer. One end of the cylinder is open to take in the fuel which is burnt in the centre, while the other end is connected to a chimney having a butterfly valve for manual control of the temperature of the drying air.

The drying chamber is provided with an exhaust vent with an adjustable opening at the top, the report says.

The fuel, mostly agricultural waste and wood chips, is burnt in a welded wire mesh tray in the centre of the burning chamber. The high temperature of the flue gases heats the drums and the fins, and the heat is transferred to the surrounding air by radiation and convection.



The hot air comes in contact with the wet material as it moves upward. The moisture-laden air then escapes from the exhaust vent. The process creates a cycle of natural convection of air through the drying trays. The material is stirred frequently and the position of the trays interchanged to achieve uniform drying.

The dryer can take a load of 100 kg of wet material per batch. The dryer is estimated to cost Rs. 5700, with the cost of drying working out to be a mere 25 paise per kilogram which compares well with sun-drying. It also offers the additional advantages of improved material quality and drastic reduction in processing time. Besides, there is no need to expose the material to the open air for secondary drying which is required in the case of sun-drying.  
(P.T.I. Science Service 9(3), 1990, 4)

### Low temperature drying systems

For products which are temperature sensitive, drying at high temperature deteriorates their quality. In such instances, the solution lies in surrounding the product with dry air without the risk of product spoilage. Bry-Air specialises in such types of low temperature drying at temperature below 75 F. Bry-Air dehumidifiers speed up product, drying by continuously removing moisture from the surrounding air by a process of physical adsorption where the adsorbent used is a desiccant.

Bry-Air units are custom designed for specific requirements. They are available in different models with different drying capacities. Bry-Air dehumidifiers find applications in various industries where low temperature drying is required like drying of cocoa, gelatine, yeast, coffee powder, flour, starches, katha, onions, in processing powdery foods like soft drink concentrates, milk powder, sugar, in packaging and storage of biscuits, wafers, snacks and in breweries and distilleries where mold and mildew formation is prevented in hop storages, yeast rooms, fermentation and keging areas.

For more details contact: Arctic India Sales, 20, Rajpur Road, Delhi 110 054.

(Chemical Weekly 35(28), 199, 110)

### Double-drum dryer

Pragati Engineering Works has introduced a double-drum drying system for efficient removal of water and solvents from a wide variety of solutions and suspensions. It is said that this type of drying system is most economical for an endless list of chemicals, food, pharmaceuticals, etc. The feed stock is introduced into twin steam-heated drum in a uniform film by the use of a variety of feeding devices and arrangements depending upon the material to be dried.



The moisture is driven off in less than one revolution of the drum and the resultant dried solid is removed, usually in the form of thin-sheet, by a scraper blade. The dryer is suitable for applications in anhydrous sodium sulphate, barium hydrate, calcium acetate, DDT, etc.

For more details write to: Pragati Engineering Works, Shed No. W 88, A/N 8 Industrial Estate, Chikhaloli, Ambarnath, Maharashtra 421 505.  
(Chemical Products Finder 8(10), 1990, cover page)

## 97 Sigma mixer (Kneader)

Faresh offers a high efficient heavy duty Double Arm Mixer (Kneader), specially designed for uniform mixing and kneading heavier viscosity materials such as stiff pastes, different kinds of dough, adhesive polyester, premixes, flush colour and brake lining compound. The tangential action of mixing and kneading will be thoroughly obtained by 'Z' shaped spiral kneading blades having very close clearance to the vessel walls, thus kneading material will not stick to inside walls of trough. Blade is manufactured from graded cast steel/stainless steel. The mixer is neat in appearance and takes much less time to produce. Container tilting will be manual or motorised and if desired discharge facility at bottom will be provided. If required, the mixing trough will be jacketed and hydraulically tested for heating, cooling purpose and vacuum facilities. The mixer is suitable for use in industries such as chemical, pharmaceutical, confectionery, rubber, detergent, food, paint, etc. The mixer is available in working capacities ranging from 4.5 litres to 1,200 litres, in mild steel or stainless steel construction.

For more details write to: Paresh Engineering Co., 74B, Sanjay Building No.5, Mittal Industrial Estate, M Vasanti Road, Marol Naka, Andheri (East), Bombay 400 059.  
(Chemical Products Finder 8(8), 1990, 9)

## 98 Food belts

Volta International, USA, has developed a hi-tech custom blend of polymers offering an unusual combination of characteristics such as high strength, low stretch, cut resistance and flexibility. Volta Food Belts are homogenous, with no plys to come apart. They can be made endless quickly with a unique welding process, using simple tooling. They are highly sanitary due to a smooth non-porous surface on both sides. These food belts are accepted by the USDA/FDA-USA; Food Production and Inspection Branch - Agriculture, Canada; and BGA, Germany. Volta food belts can be fabricated easily to meet the needs from standard roll widths of 60". Longitudinal splices. V-guides added versatility and performance. Applications are in meat, fish, and poultry processing; fruit and vegetable canning; cheese processing; food packing and processing; frozen food processing; bakeries; chocolate, snack foods and ice cream production; and pharmaceutical industry.



For further information write to. Simplicity Projects Pvt Ltd.,  
17 Community Centre, Mayapuri, Phase 1, New Delhi 110 064.  
(Industrial Products Finder 18(5), 1990, 155)

## Pumps for beverages industry

The Series NU pumps from Netzsch Mohnopumpen GmbH, West Germany, are used mainly in the beverages industry, but also wherever pumps do not have to operate under extremely difficult conditions. They are particularly attractive, of short design, and directly flanged to the drive unit (electric motor, gear motor, or variable speed gear unit). They are available for outputs upto  $150 \text{ m}^3/\text{hr.}$  and pressure heads upto 12 bar.

For further information write to: Techman Tara Universal, 308, TTK Road, Madras 600 014.  
(Industrial Products Finder 18(6), 1990, 219)

## 100 Pulverisers

Batliboi offers a range of pulverisers and hammer mills for application such as disintegration, fine grinding, granulating, deagglomeration and fiberising. These systems are extremely versatile for pneumatic and mechanical handling of materials in different sizes without intermittent handling of materials between the processes.

The company also offers complete spice grinding plants comprising cleaning, pulverising, mixing and packaging systems. The various stages of operation of these plants are cleaning of spices by eliminating particles and impurities and thereafter pulverising the same through high-tech system with autoservo control to monitor the feed rate uniformly. This minimises checking as well as clogging of the oil based materials. It also includes a built-in heating system which obviates the conventional sun drying process. A sieving machine ensures separation of coarse and fine powder.

Subsequently the mixing operation takes place and then dosing and packing in a fully automatic packing machine.

For more details quote Ref No. PUB/PR/21/90 and write to Batliboi and Company Ltd., P.Box 479, Bombay-400 001.  
(Financial Express 22 April 1990, 6)

## Packaging

## 101 Flexible packaging film for food

Scharr Industries, Inc. manufactures metallized film for packaging food products such as candy, snack foods, and coffee. It



is said to offer excellent MVTR and O2TR barrier and a light barrier that prevents oxidative rancidity. Its bright foil appearance, high slip, high resistance, and flexibility combine to make it a material that results in attractive laminations.

For more details write to: Scharr Industries, Inc, 40 E Newberry Road, Bloomfield, Connecticut 06002, U.S.A.  
(Chemical Products Finder 8(10), 1990, 132)

#### 102 New aluminium foil retort packaging system

Toyo Aluminium of Japan has marketed a new aluminium foil retort packaging system "Al-Elepouch", which can be heated in a microwave oven. This packaging system consists of a transparent plastic film pouch covered with a layer of a strippable aluminium foil/heat-resistant plastic film laminate envelop. The pouch, designed to stand upright, turn microwave-heatable when the outer layer of aluminium foil is peeled off.

For details, contact: Toyo Aluminium Co., 25-1, Minami Kyutaro-machi, 4-chome, Higashi-ku, Osaka-541, Japan.  
(Asia Pacific Tech Monitor September-October 1989, 27)

### Analysis

#### 103 New rice aroma estimation

A Gujarat-based agroscientist has developed a new quick method to estimate the aroma of a rice variety by determining its volatile carbonyl constituents.

The major carbonyl compounds present in rice are acetone, hexanal, branched ketones, heptanal, octanal, nonanal and phenylacetaldehyde. Another carbonyl compound 2-acetyl-1-pyrroline is found ten-fold in scented rice varieties compared to non-scented varieties.

A team of scientists headed by Dr. M.K. Chakraborty at the Gujarat Agricultural University, Anand, has developed a new technique that estimates the aroma of leaves of seven-week-old plants. At this stage, the rice plants complete tillering and grain setting starts.

The method makes use of a thermostat-controlled water bath maintained at 40 C, nitrogen gas cylinder, nitrogen gas bubbler, a two-necked round bottom flask, a glass column with activated charcoal, and water-jet filter pump for mild suction.

Addition of potassium hydroxide to an aqueous suspension of the leaves maintained in a flask in a water bath liberates the volatile constituents. The vapours are trapped by activated charcoal in a glass column for about an hour. The absorbed volatiles are leached



out into a flask by eluting with a solvent mixture containing equal amounts of peroxide-free diethylether and carbonyl-free methanol. A sensory test of the eluent indicates the fragrance of the variety.

A person can analyse about 25 samples in a day and already scientists in the Gujarat Agricultural University have analysed many rice varieties using this technique.

(P.T.I. Science Service 9(3), 1990, 5-6)

## Commercial Intelligence

### Production (Raw Materials)

#### 04 Estimates of production of total oilseeds

(Thousand Tonnes)

State/Union Territories	1986-87	1987-88 (Final)
Andhra Pradesh	1436.3	1853.4
Arunachal Pradesh	15.5	15.5
Assam	160.5	179.9
Bihar	124.3	118.5
Gujarat	1674.1	401.2
Haryana	226.3	333.0
Himachal Pradesh	5.3	3.3
Jammu and Kashmir	62.6	39.7
Karnataka	1256.4	1570.6
Kerala	9.4	7.9
Madhya Pradesh	1251.6	1464.9
Maharashtra	838.1	1248.4
Manipur	2.9	2.9
Meghalaya	5.5	5.5
Mizoram	1.4	1.5
Nagaland	11.3	6.4
Orissa	798.9	849.6
Punjab	166.4	235.9
Rajasthan	882.6	1230.1
Sikkim	11.4	12.1
Tamil Nadu	1138.2	1324.4
Tripura	4.3	6.0
Uttar Pradesh	916.7	955.6
West Bengal	263.8	506.2
Dadra and Nagar Haveli	0.1	0.1
Delhi	0.3	0.4
Pondicherry	5.5	5.3
ALL-INDIA	11269.7	12378.3

(The Oils and Oilseeds Journal 41(10-12), 1989, 20)



- 105 The estimated production of oilseeds and vegetable oils during 1988-89 crop year

(In Million Tonnes)

Oilseeds	Estimated Production			Used for sowing/ edible purposes		Balance marketable surplus	Oil re- covery %	Estima- tion of oi-
	Kharif	Rabi	Total	in %	in quan- tity			
Groundnut in shell	5.700	2.000	7.700	20	1.540	6.160 (on in-shell basis)	29	1.0
Mustard- Rapeseed/Toria	0.000	4.000	4.000	2	0.080	3.920	35	1.0
Sesameseed	0.550	0.200	0.750	10	0.075	0.675	40	0.0
Sunflowerseed	0.250	0.400	0.650	2	0.013	0.637	30	0.0
Soyabean	1.700	0.000	1.700	10	0.170	1.530	17	0.0
Safflowerseed	0.000	0.500	0.500	5	0.025	0.475	23	0.0
Nigerseed	0.200	0.000	0.200	2	0.004	0.196	30	0.0
Linseed	0.000	0.450	0.450	2	0.009	0.441	38	0.0
Castorseed	0.400	0.000	0.400	5	0.020	0.380	40	0.0
<b>TOTAL</b>	<b>8.800</b>	<b>7.550</b>	<b>16.350</b>		<b>1.936</b>	<b>14.414</b>		<b>4.3</b>

(The Oils and Oilseeds Journal 42(1-3), 1989, 40)

- 106 Estimated production (availability) of vegetable oils during 1988-89 crop year

Supply		(In Million Tonnes)	
1. Oils from cultivated oilseeds		4.366	
2. Coconut Oil		0.250	
3. Rice Bran Oil		0.350	
Edible Variety			
Non-Edible	0.175		
4. Cottonseed Oil	0.175		
5. Solvent Extracted Oils from Oilcakes		0.350	
Groundnut oilcake			
Rapeseed-Mustard oilcake	0.070		
Cottonseed oilcake	0.060		
Sunflower oilcake	0.015		
Miscellaneous oilcakes	0.040		
6. From oilseeds of forest origin	0.015	0.200	
Salseed			
Mowrah	0.015		
Neem	0.020		
Others	0.030		
7. Acid oils	0.010	0.075	
		0.100	
<b>TOTAL</b>		<b>5.691</b>	

(The Oils and Oilseeds Journal 42(1-3), 1989, 37)



## 7 Rice bran oil production

(In tonnes)

Year	Edible	Non-edible	Total
1985-86	32,850	1,85,055	2,17,900
1986-87	94,950	1,62,150	2,57,100
1987-88	1,45,000	1,45,000	2,90,000

(The Oils and Oilseeds Journal 42(1-3), 1989, 32)

## 08 Requirement and production of vegetable oils and vanaspati

In reply to a question in Rajya Sabha on July 28, 1989, the Minister of Food and Civil Supplies, Shri Sukh Ram, stated that the total requirement and production of vegetable oils during the last three years are as under:-

Year (Nov-Oct)	(Qty. in lakh tonnes)	
	Requirement	Supply
1986-87	48.45	33.48
1987-88	54.68	37.67
1988-89	55.34	47.80*

1) The figures include the oil required for the manufacture of vanaspati also.

(\*) Based on an estimated oilseeds production of 160 lakh tonnes.  
(The Oils and Oilseeds Journal 42(1-3), 1989, 28)

## 109 World aquaculture production of shrimp, 1989

Country	% of world production	Heads on production (metric tons)	Hectares production	Kilograms/ Hectare
China	29	165,000	145,000	1,138
Indonesia	16	90,000	250,000	360
Thailand	16	90,000	80,000	1,125
Philippines	9	50,000	200,000	250
Ecuador	8	45,000	70,000	643
Vietnam	5	30,000	160,000	187
India	4	25,000	60,000	416
Taiwan	4	20,000	4,000	5,000
Central America and Caribbean	2	12,000	12,000	1,000
South America (excluding Ecuador)	1	7,000	8,000	875
Others	5	30,800	103,300	298
Total		564,800	1,092,800	517

(The Economic Times 21 April 1990, 4)



## 0 Egg production

India has emerged as the fifth largest egg producing country in the world with the current national output touching 20,000 million eggs annually, the Union Agriculture Secretary, Mr.S.K.Mishra, said here on Tuesday.

(Financial Express 1 February 1990, 5)

## Production (Industrial)

### 1 Sugar production

According to the Indian Sugar Mills Association the sugar production during the month of February, 1990 was about 17.72 lakh tonnes as against 17.19 lakh tonnes during the same month last year. This brings the total output during the season 1989-90 to 65.07 lakh tonnes as against 59.69 lakh tonnes during the corresponding period last year.

The closing stock of sugar as on 28.2.90 was 38.45 lakh tonnes comprising of 37.80 lakh tonnes indigenous sugar and 0.65 lakh tonnes of imported sugar in all, inclusive of stocks held at the ports and the FCI godowns at different consuming centres. The corresponding figure of stock on the same date last season was 42.27 lakh tonnes comprising of 42.12 lakh tonnes indigenous sugar and 0.15 lakh tonnes of imported sugar.

(Indian Sugar Mills Association, Press Release, 22 March 1990)

### 12 Soft drinks production

Soft drinks production in the country has doubled from 3,200 million bottles in 1985 to 6,500 million bottles in 1989 registering an impressive growth rate of 26 per cent.

The soft drinks market in the country crossed the Rs. 900 crore-mark during 1989.

The organised sector accounting for 48 per cent of the total production during the year. However, in terms of value it accounted for 67 per cent.

Although the Indian soft drink industry is one of the largest in the world, the per capita consumption is as low as eight bottles per annum.

(Deccan Herald 11 February 1990, 14)

## Export

## 113 Exports of oilseeds, oilmeals and oils/fats 1987-88, 1988-89 (Est.) &amp; 1989-90 Target\*

Sr. No.	Commodity	1987-88		1988-89 Provisional		1989-90* Target	
		Quantity M. T.	Value Rs. Cr.	Quantity M. T.	Value Rs. Cr.	Quantity M. T.	Value Rs. Cr.
1.	HPS Groundnut	4,800	5.00	37,000	35.00	50,000	50.00
2.	Sesameseed	-	-	18,000	20.00	30,000	30.00
3.	Nigerseed	6,800	7.00	13,000	13.00	12,000	12.00
4.	Kardiseed	-	-	-	-	10,000	7.00
5.	Castor Oil	33,000	48.00	45,000	75.00	60,000	100.00
6.	Soya Ext.	3,11,300	86.00	6,87,500	266.00	9,00,000	350.00
7.	Groundnut Ext.	2,89,000	71.00	2,50,000	50.00	3,50,000	70.00
8.	Cottonseed Ext.	23,000	4.50	15,000	3.00	25,000	5.00
9.	Rice Bran Ext.	3,53,000	28.00	3,90,000	36.00	5,50,000	55.00
10.	Rapeseed Ext.	43,800	4.00	1,25,000	20.00	3,00,000	45.00
11.	Sunflower Ext.	38,600	4.00	75,000	10.00	1,00,000	13.00
12.	Sesame Ext.	9,500	2.00	20,000	4.50	50,000	11.00
13.	Salseed Ext.	24,000	1.50	20,000	1.50	25,000	2.00
14.	Mango Kernel Ext.	-	-	22,000	3.00	25,000	4.00
15.	Other Extractions	5,000	1.00	5,000	1.00	10,000	2.00
16.	Mango/Sal/Kokum fats	2,500	6.00	1,500	4.00	5,000	12.00
TOTAL		11,43,800	268.00	17,24,000	542.00	25,02,000	768.00

\* Subject to normal production, price parity and grant of various incentives.  
(The Oils and Oilseeds Journal 41(10-12), 1989, 27)

## 114 Export of oilseeds extractions

	1987-88		1988-89	
	Quantity (Tonnes)	Value (Cr.) Rs.	Quantity (Tonnes)	Value (Cr.) Rs.
Groundnut extractions	2.89 lakhs.	71	2.50 lakhs	50
Soyabean extractions	3.11 lakhs	86	6.92 lakhs	273
Rapeseed extractions	43,800	4	1.25 lakhs	20
Sesame extractions	9,500	2	20,000	4.50
Cottonseed extractions	23,000	4.50	15,000	3

(The Oils and Oilseeds Journal 42(1-3), 1989, 66)



Production of solvent extracted oils and export of extractions for the period 1.4.88 to 31.3.89 - 12 months and comparative period for last year 1987-88 (12 months) In Bracket  
PROVISIONAL

(Quantity in M.T.  
Amount in Rs.)

Sr. No.	Commodity Oilcake/ Seed/Bran	Production of S.E. oil				Production of extrac- tion M.T.	Export		
		Processed	Edible	Industrial	Total		Quantity	F.O.B.	Unit value
		M.T.	M.T.	M.T.	M.T.		M.T.	Rs.	Rs.
1	2	3	4	5	6	7	8	9	10
Export of Extractions									
1.	Rice Bran	2081896 (1940476)	124306 (118647)	174415 (159378)	298721 (278025)	1766119 (1649793)	3,88,046 (3,52,751)	3599,18,817 (2802,67,322)	927 (794)
2.	Sunflower oilcake	200408 (181113)	18449 (15820)	5620 (6960)	24069 (22780)	176576 (157848)	75,886 (38,614)	982,39,358 (385,67,038)	1294 (998)
3.	Rapeseed oilcake	331151 (259685)	22036 (18185)	6229 (6347)	28265 (24532)	300218 (233099)	1,21,223 (43,319)	1725,70,075 (400,81,833)	1423 (925)
4.	Salseed	48979 (84151)	351 (3081)	5911 (7671)	6262 (10752)	41995 (71412)	21,517 (23,884)	173,02,490 (144,00,834)	804 (602)
5.	Mango kernel	21590 (6657)	- (-)	1945 (600)	1945 (600)	18977 (5706)	20,459 (-)	260,18,323 (-)	1271 (-)
6.	Mahua oilcake	54661 (70771)	10 (229)	4681 (6503)	4691 (6732)	48875 (62521)	56 (16)	2,10,748 (55,572)	3763 (3473)
7.	Kokum oilcake	- (369)	- (-)	- (41)	- (41)	- (322)	- (-)	- (-)	- (-)
8.	Kardi oilcake	21890 (32298)	1211 (1174)	560 (1429)	1771 (2603)	20529 (29788)	- (-)	- (-)	- (-)
9.	Sesame Seed oilcake	43885 (21579)	2513 (1099)	1235 (638)	3748 (1737)	39903 (19938)	17,770 (9,454)	401,98,550 (214,58,270)	2262 (2269)
10.	Nigerseed oilcake	242 (4425)	13 (153)	- (284)	13 (437)	225 (3959)	- (-)	- (-)	- (-)
11.	Copra oilcake	40275 (34562)	730 (647)	2609 (2315)	3339 (2962)	37217 (31583)	- (-)	- (-)	- (-)
12.	Kusum seed	595 (1772)	- (-)	71 (208)	71 (208)	169 (1562)	- (-)	- (-)	- (-)
13.	Karanja seed	5282 (9048)	- (-)	602 (972)	602 (972)	4658 (8038)	- (-)	- (-)	- (-)
14.	Maize seed	293 (585)	- (12)	39 (86)	39 (98)	250 (484)	- (-)	- (-)	- (-)
15.	Tumba seed	726 (-)	- (-)	36 (-)	36 (-)	698 (-)	- (-)	- (-)	- (-)
16.	Ambadi seed	1602 (1250)	- (50)	80 (-)	80 (50)	1482 (1221)	- (-)	- (-)	- (-)
17.	Palsa seed	54 (949)	- (-)	3 (94)	3 (94)	48 (836)	- (-)	- (-)	- (-)

1	2	3	4	5	6	7	8	9	10
18. Peanut Meal	-	-	-	-	-	-	-	-	-
	(-)	(-)	(-)	(-)	(-)	(-)	(108)	(7,32,618)	(6783)
19. Palm Kernel	-	-	-	-	-	-	3,083	32,37,150	1050
	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
20. Others	1341	-	179	179	1093	-	-	-	-
	(416)	(-)	(26)	(26)	(387)	(-)	(-)	(-)	(-)
21. Sal Oil*	-	-	-	-	-	-	1,157	261,11,311	22568
	(-)	(-)	(-)	(-)	(-)	(-)	(1,558)	(376,13,638)	(24142)
22. Mango Kernel*	-	-	-	-	-	-	220	60,03,986	27290
oil	(-)	(-)	(-)	(-)	(-)	(-)	(722)	(192,18,067)	(26617)
23. Kokum oil*	-	-	-	-	-	-	111	32,60,392	29372
	(-)	(-)	(-)	(-)	(-)	(-)	(159)	(48,50,000)	(30503)

\* Exports of fats (oils)

(The Oils and Oilseeds Journal 41(10-12), 1989, 35-37)

## 16 Gingelly seeds export jacks up oil prices

Large-scale export of gingelly seeds has resulted in a flare-up of its oil price in Tamil Nadu in the last few months.

It is said that export of the seeds during the current crop year is projected to cross one lakh tonnes as against 40,000 tonnes last year. Out of this, 75,000 tonnes have already been exported, according to trading circles.

Consequently, the price of a bag (75 kg) of gingelly seeds has shot up from Rs. 740 in October last to Rs. 1,300 now in the State. The price of its oil has also gone up in tandem, from Rs. 380 to Rs. 530 per 15 kg.

(Financial Express 25 April 1990, 4)

## 7 Spices export cross target

Spices exports during 1989-90 has earned foreign exchange of Rs. 274.36 crores with the exports crossing the target of 86,700 tonnes according to a Spices Board press release, PTI reports.

While the total exports of spices which was 99,886 tonnes during the period registered an increase, pepper which constitutes the bulk of the spices exports had fallen below the target. Pepper exports during the year was 36,600 tonnes as against the targetted 42,000 tonnes, the release said.

The primary reason attributed to this was the low production of just around 45,000 tonnes during the season, compared to the 1988-89 output of 65,000 tonnes.



Besides, the earning through pepper exports had also dropped to Rs. 159.87 crores from Rs. 188 crores recorded last year owing to increased global competition and fall in international price of the product.

In small cardamom, domestic prices ruled at twice the level of international prices throughout the year which made export impossible. The level of USSR buying of small cardamom during the current year was also negligible. Cardamom exports were a mere 171 tonnes during the year against the targetted 350 tonnes, the release said. (The Economic Times 25 April 1990, 2)

## 8 Rice export

India exported rice worth Rs. 297.17 crores during April-September (1989-90) which is 91.6 percent more than the exports of Rs. 155.06 crores during the corresponding period in 1988-89.

In quantity terms, 3.06 lakh tonnes were exported in the same period as against 1.90 lakh tonnes in the corresponding period last year (1988-89) registering an increase of 62 per cent.

During 1988-89, rice exports were of the order of Rs. 331.47 crores which was 2.1 per cent higher than Rs. 324.57 crores in 1987-88.

Basmati rice export during 1988-89 was of the order of 3,49,687 tonnes valued at Rs. 333.53 crores as against an export of 3,66,111 tonnes valued at Rs. 339.98 crores during 1987-88.

The major importers of Indian basmati rice are the Soviet Union, the United Kingdom and the Gulf region. (The Economic Times 18 April 1990, 2)

## 19 Export price for basmati rice

The Union government has decided to fix the minimum export price for basmati rice at Rs.9,500 per tonne (F.O.B.) with immediate effect, according to an official release. Under the import-policy for 1990-93, the government had allowed export of basmati rice under open general licence (OGL) subject to minimum export price. (The Economic Times 19 April 1990, 4)

## 20 CCS for cashew exports

The Centre has decided to grant cash compensatory support (CCS) on the export of certain agricultural products and processed food items including cashews, according to Cashew Export Promotion Council of India (CEPCI).



The eight per cent CCS granted on export of roasted salted cashew kernels is for the consumer packs of one kg or less. This will be applicable to exports effected in pursuance of offers/orders/contracts received and finalised on or after January 5, 1990 and will be valid upto March 31, 1992.

In November, the prices for wholes advanced marginally, while it declined sharply for brokens. The export price for wholes averaged at Rs. 82.40 per kg which was 0.05 per cent higher than the October 1989 price of Rs. 82.36 per kg and 1.24 per cent higher than the November 1988 price of Rs. 81.39 kg.

The export price for brokens averaged at Rs. 61.69 per kg which was 3.89 per cent less than the October 1989 price of Rs. 64.19 per kg and 3.61 per cent less than November 1988 price of Rs. 64 per kg.

During January-November 1989, the average unit price realised for wholes was Rs. 83.78 per kg., 2.6 per cent higher than the corresponding price of Rs. 81.60 per kg in the previous year. But, in the case of brokens, the unit price at Rs. 62.95 per kg was less by 8.44 per cent than Rs. 68.75 per kg the previous year.

Imports during January-November 1989 thus remained at 34,437 tonnes valued at Rs. 464.2 million.  
(Economic and Commercial News 20(11), 1990, 9-10)

## 121 Cashew kernels export

Export of cashew kernels from India registered a growth of 37 per cent both in quantity and value in 1989, reports PTI.

During the period, exports totalled 43,880 tonnes earning an all time high of Rs. 354.65 crores. The previous high was Rs. 340.30 crores in 1987.

Exports to major markets like Australia, Canada, Kuwait, Netherlands, New Zealand, Singapore, the United States and the Soviet Union witnessed improved performance.  
(The Economic Times 26 April 1990, 3)

## 122 New norms for jaggery exports

The ceiling for export of jaggery has been placed at the disposal of Agricultural and Processed Food Product Export Development Authority (APEDA), according to a special procedure devised by the Ministry of Commerce.

The Import and Export Policy of 1988-91 permits jaggery exports against limited ceiling.

According to the new procedure, the exporters will have to register their contracts with the authority and submit bank guarantees.



The Authority will not allocate more than 5000 tonnes to any individual exporter unless he has irrevocable letter of credit. Exports will have to be compulsorily effected within 45 days of registration with the Authority. In case of failure, the registration will automatically be cancelled by the Authority.

The Authority will issue ceiling slips to the exporters fulfilling the required conditions on first-come-first-served basis indicating full particulars such as the name of the exporter, number and date of the order and the irrevocable letter of credit, quantity allowed, FOB value and the destination.

The Authority shall send release advice along with the bank guarantee to the Port Licensing Authority concerned which, on its receipt, will ensure that an export licence valid for, 45 days is issued within 48 hours.

According to the new procedure, APEDA will ensure that no registration takes place beyond September 30 and no licence with validity beyond that date is issued. The entire exports will have to be made within the validity period failing which the bank guarantee will be forfeited by the Government. The Authority is required to report to the Ministry of Commerce as soon as the ceiling is exhausted.

(Economic and Commercial News 20(11), 1990, 9)

## 23 Onion export

India exported 2,32,000 metric tonnes of onions between April 1989 and December 31, 1989. The export during the corresponding period of the previous year was 1,39,519 metric tonnes indicating growth of 66 per cent. The target fixed for 1990 is 300,000 metric tonnes.

NAFED is incidentally the canalising agency for the export of onions. The export is done under Open General Licence. Private trade also is eligible to export onions as Associate Shippers.

The share of NAFED in the total export of onions during 1989 was 23 560 metric tonnes. Efforts are underway to raise this to 50,000 metric tonnes during 1990.

(Economic and Commercial News 20(12), 1990, 7)

## 24 Record coffee exports

The Indian Coffee Board has achieved a record export of 145,000 tonnes till date during the year 1989-90 even as the domestic market has absorbed more than 63,000 tonnes so far, according to reports.

The Board signed two contracts with Soviet Union last month for the supply of 50 000 tonnes of green coffee and 5,000 tonnes of instant coffee worth nearly Rs. 1850 million.



For the 104220 tonnes export of the total 145000 tonnes for which figures were available India earned foreign exchange worth over Rs. 3040 million during 1989-90. The Government, it may be recalled has set an export target of Rs.4,000 million for the year.

The Board proposes to immediately explore prospects for export of instant coffee. It is of the opinion that India should be able to effectively compete in the international market in instant coffee produced from lower grades with use of aromatisation and other advanced techniques developed in this industry.

A programme for encouraging Research and Development in this context with the collaboration of instant coffee manufacturers is also likely. According to the Board, it should explore promotion of coffee consumption in non-traditional areas in a bigger way. It has decided to promote Research and Development of alternative uses such as coffee-based confectionery, coffee, colas, and decaffeinated coffee.

With regard to the uncommitted balance of coffee stock available with the Board till date amounting to 42,000 tonnes, the Board expects to dispose it before the current financial year by way of export as well as domestic sales.

(Economic and Commercial News 20(10), 1990, 7-8)

#### 125 Volume of exports of Indian tea

Year	Qty M. Kg	Value Rs. in crores	U/price Rs./Kg.
1983-84	202.30	557.55	27.56
1984-85	217.40	771.39	35.48
1985-86	222.92	674.24	30.25
1986-87	203.70	619.23	30.67

(Financial Express 24 April 1990, 10)

#### 126 Record export of marine products

The export of marine products has touched a new peak during 1988-89.

The country exported 158,000 tonnes of marine products worth Rs. 632.50 crore. This represents a growth of 61 per cent in volume and 20 per cent in value over the previous record of 97,900 tonnes valued at Rs. 525.11 crore in 1987-88, according to an official press release here.

Frozen shrimp continued to lead the list of marine exports with 57 per cent share in volume and 79 per cent in value the release said.  
(Deccan Herald 17 April 1990, 14)



## Shrimp export

Year	Shrimp exports volume (tonnes)	value (in crore) Rs.	Unit value Rs./kg	Marine product exports	
				Volume (tonnes/crore)	Value Rs.
1986-87	49203	377.93	76.8	85843	460.67
1987-88	55736	425.78	76.4	97179	531.20
1988-89	56835	470.33	82.8	99777	597.85

(The Economic Times 21 April 1990, 4)

## 8 CCS for more items

The Government has granted cash compensatory support (CCS) ranged from five per cent to 22 per cent for the export of a number of items. The range of products includes agricultural and processed foods, chemicals and allied products, engineering and plastic goods.

The CCS is effective from January 5, according to a notification issued by the Ministry of Commerce. The concessions are valid up to March 31, 1992.

The food items and machinery eligible for CCS are: pressure cookers 10 per cent; biscuit making machinery eight per cent; dairy machinery including milk processing modules, cream separators, components and spare parts as well as tea processing machinery 10 per cent; mango juice, pineapple juice, guava pulp and concentrates, all eight per cent; papaya concentrates five per cent; strawberry jam, raspberry jam eight per cent; cashew kernels roasted and/or salted in consumer packs of one kg or less eight per cent; tamarind kernel powder/de-husked five per cent; pineapple titbits/slices eight per cent.

The CCS rates will be applicable to exports of these items in pursuance of offers/orders/contracts received and finalised on or after January 5, 1990.

(Economic and Commercial News 20(4), 1990, 10-11)

## 129 New Registering Offices for export of agro products

The Union Commerce Ministry has made changes in the registering authorities for the export of some agriculture items including extractions.

As per a public notice issued by the Chief Controller of Import and Exports on February 22, the registering authority for animal/poultry feed compound, mango kernel oil, salsed oil, rice bran extractions, and other items of extractions not mentioned elsewhere, the registering authority will now be the Solvent Extractors Association of India, Bombay.



For groundnut extraction, the registering authority will be the Groundnut Extraction Export Development Association, Bombay.

Similarly, Soyabean Processors Association of India, Indore, will be the registering authority of the export of soyabean extractions/meal while All India Cottonseed Crushers Association, Bombay will be the registering authority for Cottonseed extractions.

With regard to exporters of animal/poultry feed compound, mango, kernel oil and salseed oil, the registration-cum-membership certificate already issued by the Agricultural Products Export Development Authority, New Delhi, will continue to remain valid up to six months from February 22 or up to the date of its validity whichever is earlier, it was stated.

Similarly, with regard to other products the registration-cum-membership certificate already issued by the export promotion officers will continue to have validity up to six months from February 22 or up to the date of its validity, whichever is earlier. Thereafter, the registered exporters would be required to produce the registration-cum-membership certificates issued by the nominated authorities concerned.

(Economic and Commercial News 20(10), 1990, 8)

### 130 Export documents simplified

The government today announced simplification of export documents to give the much needed relief to exporters. Apart from other relaxations, exporters would now have to prepare only two master documents, instead of the present 25, relating to pre-shipment of export cargo.

Adoption of the new documentation system is expected to enable the exporters to save at least 50 per cent of the time and cost presently spent by them on documentation. It will also help in expediting the decision-making process, virtually eliminate the chances of errors, and facilitate electronic transmission of documentation and data.

Currently, Indian exporters are required to submit about 25 documents to various agencies and authorities merely to ship the goods. Each document has to be individually prepared. The new system has sought to standardise these documents and also to align them to each other, on the basis of the United Nations key, which has been adopted by most of India's trade partners. Thus, instead of typing out 25 documents, an exporter would now have to prepare basically only two documents.

(The Economic Times 15 February 1990, 1)



## Import

### 1 Import of palmolein

Palmolein is being imported from Malaysia and Indonesia.

The total quantity of Palmolein imported in the last 3 years.

Financial Year	Qty. MT
1986-87	6.02 lakh
1987-88	8.85 lakh
1988-89	5.20 lakh

(The Oils and Oilseeds Journal 42(1-3), 1989, 48)

### 32 Import of edible oil by the STC

Financial Year	Quantity (Lakh MT)	CIF value (Rs. crores)
1987-88	19.67	947
1988-89	10.89	765

Imports were made from USA, Brazil, Argentina, Canada, Malaysia, Indonesia and Europe by STC only.

(The Oils and Oilseeds Journal 42(1-3), 1989, 48)

### 33 No move to import sugar

The Government has no intention to import sugar this year in view of the good prospect of sugar production, according to an official release.

The statement follows reports in a section of the press that the Government proposes to import sugar this year.

(Financial Express 12 April 1990, 1)

## Trade Information

### 134 Soft drinks in India

Soft drinks production in the country has doubled from 3,200 million bottles in 1985 to 6,500 million bottles in 1989, registering an impressive growth rate of 26 per cent, reports UNI from New Delhi.

This was revealed in a recent review on the soft drinks market by the Operations Research Group (ORG).

The soft drinks market in the country crossed the Rs. 900 crore mark during 1989.

Although the Indian soft drink industry is one of the largest in the world, the per capita consumption is as low as eight bottles per annum.

Aerated soft drinks are the most popular category, accounting for almost 80 per cent of the market. Tetra pack drinks introduced in the country in 1986 have a share of 10 per cent and the rest is accounted for by the non-aerated bottle drinks  
(The Times of India 12 February 1990, 6)

### 135 The world's ten top achievements in food technology

Food technology and food science have seen great developments abroad, particularly in Western Europe and North America in the last 50 years or so. The Institute of Food Technology of USA recently listed the top ten achievements in food technology in the last 50 years. Most of these landmarks in food are hardly known to the masses in our food scarce country. These are:

1. Aseptic Technology: This technology has been a remarkable development, as tetrapak has been popular throughout the world. Everyday 100 million aseptic packages roll off tetrapak machines around the globe.

2. Canning process with safe preservation of foods.

3. Microwave oven is making a revolution in home cooking. By the year 2000 AD, 90% of American households will be cooking with microwave ovens and the same trend may follow in Western Europe and Japan.

4. Frozen concentrated citrus juices.

5. Atmosphere-controlled packaging for fresh fruits and vegetables.

6. Freeze drying.

7. Frozen meals.

8. Irradiation of foods.

9. Food fortification practices which have improved public health.

10. Ultra-high temperature/short term sterilisation of milk and other products.

The above ten innovations have helped ensure healthier eating habits and also reduced food bills significantly in the advanced affluent countries.  
(Chemical Weekly 35(30), 1990, 105)



### Curbs on vanaspati expansion eased

The Union Government is reportedly allowing capacity expansion by private sector vanaspati units more liberally. The Government has recently cleared five proposals for capacity expansion in the private sector. The five proposals are those of Oswal Vanaspati and Oil Mills, Ludhiana, Agarwal Industries, Hyderabad, Haryana Vanaspati and General Mills, Swarup Vegetable Production, Uttar Pradesh and Deepak Vegetable Oil India Pvt Ltd., Gujarat. According to the Union Ministry of Food and Civil Supplies, the proposals for expansion of existing units will be considered irrespective of which sector the units belong to. Expansion may be allowed from the minimum economic size of 25 tonne per day to 50 tonne per day depending on the location.

(Industrial Products Finder 18(6), 1990, 139)

### 7 Food processing: Assocham seeks excise relief

The Associated Chambers of Commerce and Industry (Assocham) has urged the Government to withdraw the excise hike on jams, jelly and juices proposed in the 1990-91 Budget.

In its view, the doubling of excise levy will inhibit the growth of food processing industry.

Assocham has also called for a review of the excise duty on indigenous equipment required for preserving food products and food-based beverages, with a view to making their cost economical. The present excise duty, which in some cases is as high as 63 per cent adversely affects the cost of refrigeration equipment.

In a note to the Finance Minister on the subject, Assocham said fruits and vegetables being perishable commodities, a substantial part of the production goes waste in the absence of modern processing and preserving facilities.

According to one estimate, the annual wastage in the country of fruits and vegetables is of the order of Rs. 3500 crores and the reason for this colossal wastage is the lack of processing facilities in the country.

(Financial Express 26 April 1990, 4)

### 138 Solvent extractors and excise rebate removal

The Government's decision to withdraw the excise rebate on the use of non-conventional oils in the manufacture of soap and vanaspati has shocked the solvent extraction industry.



Speaking to newsmen the President of the Solvent Extractors' Association of India, Mr.H.P. Gupta said, this would put all the developmental efforts of the Technology Mission on Oilseeds and other departments of the Union Government and Industry in the reverse gear and the country would not be in a position to realise the full potential of these non-conventional oils.

He urged the Government to reconsider its decision in the light of heavy expenses incurred by the industry in upgrading such non-conventional oils which were inherently of low grade.

Elaborating the benefits experienced out of the excise rebate last year, Mr.Gupta said, the production of solvent extracted oils rose from 1.5 lakh tonnes to about five lakh tonnes in all commodities the major being rice bran oil, solvent extracted oils from oilcakes and the minor oils of tree and forest origin.

The potential from these non-conventional resources was about one million tonnes, he said. With exports rising from Rs. 270 crore to over Rs. 550 crore, the oilseeds sector achieved a net export earner status this year as against net importer status last year.

He expected the sector to reach an export target of Rs. 800 crore by 1989-90 as his Association with various Government agencies and financial institutions including the State Bank of India recently initiated a technological upgradation programme.

State Bank of India's Director in Project-Uptech Mr.A.B.Chakravarty informed that SBI was conducting a survey of the industry in Andhra Pradesh particularly to produce rice bran oil.

On having an overall view including technological innovations that are being tried by various agencies both in India and abroad, he said a comprehensive action plan would be chalked out to commence a technological upgradation exercise in the industry.

In this context, Mr.Chakravarty informed that the SBI's lending to the solvent extraction industry was substantial with a total credit of over Rs. 120 crore.  
(The Oils and Oilseeds Journal 42(1-3), 1989, 76-77)

### 139 Alcohol shortfall

An All-India survey by the Central Molasses Board has projected a shortfall of 779 lakh litres of industrial alcohol during the 1989-90 season.

It places all-India production at 9,749.89 lakh litres and all-India consumption at 10,529.18 lakh litres, leaving a deficit of 779.29 lakh litres.

Only a few States will have surpluses. Important among them are Maharashtra 238.98 lakh litres, Madhya Pradesh 233 lakh litres, Tamil Nadu 207 lakh litres and Uttar Pradesh 694.79 lakh litres.



The total availability of alcohol during the alcohol year 1988-89 was 9,422.32 lakh litres and total consumption 8,938.61 lakh litres, resulting in a surplus of 483.71 lakh litres. This surplus is after taking into account material exported out of the country by two States: 207.92 lakh litres from Maharashtra and 407.41 lakh litres from Uttar Pradesh.  
(Chemical Weekly 35(24), 1990, 57)

### Cereal consumption pattern

Per person consumption of cereals for a period of 30 days in rural areas (in kg):

State	Rice	Wheat	Jowar	Bajra	Rice + Wheat
Andhra Pradesh	11.45	0.22	1.36	0.27	11.67
Assam	13.76	0.71	-	-	14.47
Bihar	8.61	5.81	0.12	-	14.42
Gujarat	1.89	3.82	1.02	4.45	5.71
Haryana	0.84	12.44	0.15	1.05	13.28
Karnataka	4.93	0.72	4.44	0.17	5.65
Kerala	8.97	0.72	-	-	9.69
Madhya Pradesh	5.96	5.31	2.31	0.41	11.27
Maharashtra	3.21	2.19	5.99	1.17	5.40
Orissa	15.32	0.76	-	0.01	16.08
Punjab	0.97	11.06	0.03	-	12.03
Rajasthan	0.41	10.50	0.49	3.03	10.91
Tamil Nadu	9.92	0.28	0.05	0.06	10.20
Uttar Pradesh	3.83	10.41	0.14	0.31	14.24
West Bengal	13.76	1.42	0.01	-	15.18

Note: Per person consumption of jowar and bajra is insignificant in the urban areas.

(Financial Express 23 March 1990, 1)

### 41 Food processing

India has witnessed remarkable progress in the food processing industry.

There are about 2300 units licenced under the Fruit Production Order 1955. The total installed capacity of the fruits and vegetable industry in the organised and unorganised sectors taken together is about 3.80 lakh tonnes per annum. There are about 32 units registered with DGTD with the total capacity of about 1.20 lakh tonnes.

The current production of the food processing industry is placed at around 1.40 lakh tonnes (valued at over Rs. 150 crores) as against the installed capacity of 3.79 lakh tonnes, the capacity utilisation being 37 per cent. This represents 0.4 per cent of the estimated output of the manufacturing industry and less than 0.1 per cent of the gross national product.



The installed capacity of processed food increased from 4.80 million tonnes in the First Plan to 42.80 million tonnes in the Sixth Plan, while the production rose from 4.60 million tonnes to 30.17 million tonnes during the same period.

The Food Processing Ministry now has allowed multinational companies to enter in the field of food processing with latest technology for producing quality goods and expanding exports to third countries.

**Meat:** There are 140 processing units in the private sector. The country produces 13 lakh tonnes of meat, while the demand for meat is estimated at 18 lakh to 22 lakh tonnes by the end of the century. Per capita availability of meat in India is 1.8 kg per annum, while it is 104 kg per annum in New Zealand, 94 kg. in Australia, 86 kg. in the US and 65 kg. in the U.K.

**Fish:** Production of fish rose from 7.5 lakh tonnes in 1950-51 to 35 lakh tonnes in 1987-88.

**Potato products:** Potato products have very high demand in domestic markets. Potato production has increased from 4.81 million tonnes in 1970-71 to about 14 million tonnes in 1988-89. It is likely to be 16 million tonnes at the end of Seventh Plan. Demand for mash potatoes and other products emerge from the market segments like hotels, institutions, household sectors etc. Annual domestic demand for mashed potatoes is estimated to be around 60,000 tonnes.

**Cereal products:** India produces a number of cereals and therefore the processed cereal products industries do possess an enormous potential.

**Ice cream:** Production and consumption of ice-cream in India represents only the tip of the iceberg. Production of icecream which was eight thousand tonnes in 1980 is estimated around 15 thousand tonnes in 1989.

**Processed fruits and vegetables:** Production of fruits and vegetables was around 60 million tonnes. The extent of losses estimated were around 15 million tonnes. By the end of the Seventh Plan, production of fruits and vegetables is likely to exceed 70 million tonnes. In order to minimise the losses suitable programmes must be evolved and implemented to promote production of fruit product at enlarged levels.

**Salads:** With the growth of health and fat conscious of foods, salads have large untapped demand from dieticians, tourists, hospitals, house-holds etc.

**Soups:** The short-term markets for soups include hospitals, five-star hotels etc. The development of a long-term market for soups will depend upon promotional measures like information to consumers, the national health consciousness and role of food educationist. Demand for soups in Bombay, Calcutta and Delhi is estimated around 350 tonnes per annum.



**Exports:** Exports of preserved fruits and vegetables during 1987-88 amounted to 38,120 tonnes valued at Rs. 39.13 crores as against 46,933 tonnes valued at Rs. 48.93 crores during 1986-87. The drop in exports is mainly attributable to a much lower off-take by USSR which has been a major market. Exports during the period April-December 1988 were estimated at Rs. 36.97 crores.

Exports of fresh fruits and vegetables during 1987-88 was of the order of Rs. 92.98 crores as against Rs. 103.06 crores during 1986-87. Exports during April-December 1988 were estimated at Rs. 86.28 crores. Exports of fresh fruits and vegetables are expected to touch Rs. 170 crores by the end of the Seventh Plan.

Exports of marine products continue to show an increasing trend. Exports of fish and fish preparations during 1987-88 were 97.2 thousand tonnes valued at Rs. 531.20 crores as compared with 85.8 thousand tonnes valued at Rs. 460.67 crores in the preceding year. Export of these items during April-December 1988 stood at 68.1 thousand tonnes valued at Rs. 420.92 crores. Exports of spices have increased from Rs. 282.5 crores in 1985-86 to Rs. 350 crores in 1987-88.

India has one of the largest livestock population for meat production. Exports of meat and meat products during 1987-88 is placed at Rs. 93.95 crores as against Rs. 74.88 crores during 1986-87. Exports during April-December 1988 were estimated at Rs. 77.52 crores. By the end of the Seventh Plan, exports are expected to reach Rs. 115 crores. Exports of Guar Gum, Walnuts and Mushrooms during 1987-88 are placed at Rs. 120.91 crores as against Rs. 71.71 crores during the previous year. Exports during April-December 1988 were estimated at Rs. 87.43 crores. By the end of the Seventh Plan, exports are expected to reach Rs. 140 crores.

The Union Budget for 1989-90 has added 13 items of machinery to the existing list of the food processing sector and prescribed concessional duty of 40 per cent ad valorem. It has also reduced customs duty on machinery for marine food processing sector from 61 per cent to 40 per cent. The Budget for 1989-90 has also reduced excise duty rates on skimmed milk powder and condensed milk to 10 per cent ad valorem from the rates prevailing before 1989-90, but withdrew the full exemption to skimmed milk powder in one kg pack. Excise duty on preparations of fish or meat in unit containers has been reduced, while ready to cook-mixes like idli-mix, dosa-mix, vada-mix, jalebi-mix and gulab jammun-mix have been exempted. (Financial Express 1 February 1990, 3)

## 2 Steps to boost food processing industries

The Government has formulated a number of schemes for the 1990-91 Plan to provide support to the growth and development of food processing industries in various sectors.

Giving this information in the Lok Sabha on Wednesday, the Minister for Food Processing Industries, Mr. Sharad Yadav, said several schemes were being conducted from time to time for development of



various sectors of food processing industries including fruit and vegetables processing, meat processing, marine fisheries and packaging industries.

He said during the coming years efforts would be made to strengthen the processing industries to enable them to compete in the well developed international market.

Pointing out that large quantities of fruits and vegetables were spoilt for lack of proper storage facilities, the Minister said the emphasis initially would be on meeting the indigenous demand of the sector and strengthening the existing facilities.

(Financial Express 12 April 1990, 4)

### Food Regulation, Quality Control & Hygiene

#### 143 Genetic engineering

The Ministry of Environment and Forests has published in the Gazette of India, Part II-Section 3 - Sub-section (i) No. 621 - The Rules for the manufacture, use, import, export and storage of hazardous micro-organisms/genetically engineered organisms or cells applicable to the manufacture, import and storage of micro-organisms and gene-technological products.

(The Gazette of India Part II-Section 3, -sub-section(i) No.621, 5 December 1989)

#### 144 New and revised Indian Standards on Food

IS 4449: 1988	- Alcoholic drinks - Whiskies (third revision). Gr.2
IS 5960 (Part 9): 1988	- Meat and meat products - Methods of test: Part 9 Determination of total phosphorous content. Gr.3
IS 7181: 1989	- Ice cream cones (first revision). Gr.2.
IS 7592: 1989	- Peanut chikki (candy) (first revision) Gr.2.

(Standards India 3(8), (10), 1989)



## HYGIENE

## 5 Limited use of food irradiation approved in India

India's National Monitoring Agency (NMA) set up by the government to study the problems associated with food irradiation, has recently approved limited irradiation tests with a view to generate commercial use of the process which kills bacteria that cause deterioration of food.

Food irradiation recently became controversial in India following public protests over the import by India of Irish butter oil that was alleged to have been contaminated by fall out from the Chernobyl nuclear explosion

However, last November, Mr. M. R. Srinivasan, Chairman of India's Atomic Energy Commission, reported that the NMA has approved the irradiation of spices and frozen sea food for export, as well as the irradiation of onions for the domestic market.

To further the prospects of commercialisation, the Department of Atomic Energy has joined the Gujarat Agro Industries Corp. and the Spices Board of Kerala, and intends soon to set up gamma irradiation facilities as a number of places in India.  
(Chemical Weekly 35(30), 1990, 106)

## 46 Ban on tetrapack fruit drinks demanded

With a view to protect and uphold consumer rights as in the Consumer Protection Act, 1986 (COPRA), the consumer unity and trust society (CUTS) has sought a ban on the manufacture and sale of all tetrapack fruit drinks. CUTS has filed a complaint in this connection with the Calcutta Consumers District Forum.

In its complaint, CUTS has sought a ban on the advertisements of such products, namely Treetop Frooti and Pine-ap, as they were "misleading" a spokesman of CUTS said the "so-called fruit drinks were nothing but synthetic beverages".

The complaint is against the manufacturers of tetrapack fruit drinks namely North-eastern Regional Agricultural Marketing Corporation Ltd., a government of India enterprise, Lipton India Ltd and Parle Beverages Ltd., along with their associates and retailers.

Pointing out clause 11 of the Fruit Products Order, 1955, CUTS general secretary, Mr. Pradeep S Mehta, said it was clearly mentioned that no drink could be categorised a fruit product unless it contained a minimum of 25 per cent of fruit juice content.

Though Mr. Mehta said none of the tetrapack fruit drinks contained the specified 25 per cent fruit juice content, Calcutta Consumers District Forum has ordered the testing of the products by a recognised food Laboratory.



The general secretary said manufacturers of such drinks should immediately stop publishing pictures of various fruits on the tetra-packs because it was "illegal". He said no beverage product could have a fruit picture unless it had the specified fruit juice content. The Calcutta Consumer District Court would hold the next hearing after it receives the test reports of the products.  
(The Economic Times 5 April 1990, 8)

#### 147 Coffee - If tired

Coffee can increase work efficiency by improving the brain's capacity to process information according to a study by the Swiss Federal Institute of Technology. Test results showed that coffee consumption increased regularity of output and also an improvement in people's ability to process information. Coffee can improve the capacity to rapidly process information in difficult situations or when a person is tired.  
(Deccan Herald 18 April 1990, 8)

#### 148 Statutory warning on pan masala

Pan Masala Packets will soon carry a statutory warning that chewing the product may be injurious to health, PTI reports.

A gazette notification to this effect, amending the Prevention of Food Adulteration Rules, 1955, is under publication, it was officially stated here on Wednesday.

Meanwhile, a recent report released by the National Institute of Nutrition (NIN), Hyderabad, has identified the areca nut or supari and catechu components of pan masala as the main cancer-causing agents in pan masala.  
(The Economic Times 23 March 1990, 6)

#### 149 UK likely to set glazing limit for shrimp

The UK Department of Trade and Industry, is expected to introduce legislation to stop over glazing of frozen shell fish by June 1990 as a result of continuous appeals by shrimp processors. To protect the delicate flesh from damage, frozen shrimp need to have a minimum level of water glaze (around 10%). However, some unscrupulous processors started adding higher level of water glaze (Upto 40% or more) to boost profit margins. The consensus has been that processors should be required by law to declare the net weight of glaze on every pack they sold. However, the main problem is the lack of adequate enforcing system and checking method for the amount of glaze used.  
(Seafood Export Journal 22(3), 1990, 40-41)



## Transfer of Technology & New Industries

### 0 Joint venture to process meat products

A Rs. 9-crore joint venture project to process meat products will be set up in India under a new technology transfer agreement with New Zealand, according to PTI.

The agreement was signed last week in Auckland between India's Hi-tech group of companies and Fletcher groups of New Zealand, K.T.Chacko, director of the Indian Investment Centre said here.

The project, to be located either in Kerala or Punjab, will come into operation as soon as all formalities are concluded.  
(The Economic Times 4 April 1990, 8)

### 51 FRG offers tech to food processing industry

The West German industry has offered technology to the Indian food processing industry for developing R&D with a view to promoting imports of processed foods into Germany, reports PTI.

At a meeting with the members of the PHD Chamber of Commerce and Industry (PHDCCI), a visiting German delegation stressed that collaboration at the raw material production level might also have to be resorted to so as to improve the quality of raw materials.  
(The Economic Times 25 March 1990, 9)

### 152 Italy for Tie-ups in food processing sector

Italy, in concert with the United Nations Industrial Development Organisation (UNIDO), is drawing up a scheme that will lead to tie-ups between Indian and Italian firms in the food processing sector. The proposed scheme will be funded by the World Bank. There is a bright prospect for Indo-Italian cooperation in the processed food industry, says Dr. R.Orlando, Chairman of the Italian section of the India-Italy Joint Business Council. Steps are being taken to boost Indo-Italian ventures. This includes active participation by Italy in the trade fairs, the setting up of three Italian banks and two trade offices in Bombay and Delhi. A number of items have been identified for potential exports from India and these include processed food products, artificial and synthetic fibre and readymade garments.  
(Chemical Products Finder 8(8), 1990, 126)

### 153 Suraj vanaspati's new project

Suraj Vanaspati Ltd (SVL), a joint sector company promoted by Suraj Gupta Associates and PICUP, is launching a Rs. 12.50 crore project for the production of vanaspati. The project, coming up at Sikandarabad in Bulandshar district of Uttar Pradesh, will have a capacity of 33,000 tonne per annum. The commercial production is expected to start by march 1990.



Suraj Vanaspati is using modern technology by installing critical plant and machinery supplied by Alfa Laval India and other supported machinery through Mectech Process Engineering.  
(Chemical Products Finder 8(9), 1990, 153)

#### 154 Ambuja Flour to diversify

Ambuja Flour Mills Ltd is diversifying into the manufacture of ready-to-eat food. A fully automated, computerised high-tech plant for the production of ready-to-eat food is being set up. The plant, which will have a capacity of 8,000 tonne per annum, will launch commercial production by March this year. The company is also diversifying into the manufacture of beer. It has joined hands with the Bihar State Industrial Development Corporation to set up a Rs. 9 crore project to take up beer production.  
(Chemical Products Finder 8(9), 1990, 161)

#### 155 Chordia food to set up unit in Iraq

Chordia Food Products Ltd (CFDL), which has a unit for manufacturing pickles and various spices at Yavat near Pune, is setting up a factory at Baghdad in Iraq for producing pickles of green mangoes and other varieties, in technical collaboration with Iraqi firm of Al-Burakh food and can factory. This project is the first of its kind to be set up in Iraq. CFDL will be supplying plant and machinery to this Rs. 10 lakh plant, which is expected to launch production in two months.

CFDL is setting up a unit at Belgaum in Karnataka at a cost of Rs. 25 lakh. The unit is expected to be commissioned by August this year.

(Industrial Products Finder 18(5), 1990, 133)

#### 156 Reliable foods launched

A modern snacks food plant, Reliable Foods, has been set up recently at Mandideep. It has been set up with technical assistance from Western and Japanese companies. The company has launched its products in the country. It has also started exporting its products to the Middle East countries.

(Chemical Products Finder 8(8), 1990, 140)

#### 157 Asian Can's new project

Asian Can Ltd is setting up a fully automated, highly advanced can manufacturing plant, at a cost of Rs. 412.83 lakh with the main objective of manufacturing open top sanitary (OTS) cans, used for packaging processed food, marine products etc. Asian Can is the first company in India to install the most advanced machinery with powder coating technology for producing 100 per cent pore-free sanitary cans for processed food industry. The company has entered into



a technical agreement with IPU A/S of Denmark. The plant and machinery are being imported from reputed manufacturers from the UK, Germany and Switzerland.

Asian Can has an installed capacity of 4,338 tonne per annum of OTS cans. The company has already marketed products worth over Rs. 80 lakh and entered into selling pacts with Hindustan Petroleum Corporation, Wazirsons Exports, Hindustan Vegetable Oil Corporation, Dalmia Dairy and Kejriwal Exports  
(Industrial Products Finder 18(6), 1990, 109)

## 8 Modern food's second bread unit

The second bread unit of the public sector Modern Food Industries here was inaugurated by the Union Food Processing Minister, Mr. Sharad Yadav, on Saturday.

The new plant, imported from Australia has a capacity to produce one lakh buns or 30,000 loaves of 400 gm bread a day, according to the Chairman and Managing Director, Dr. Sanjeev K. Chaudhry.

The Madras unit has been adjudged the best among all the bakery units in the country and has bagged the Chairman's trophy from 1973 to 1988 successively.

Dr. Chaudhry disclosed that the company will soon come up with four baby food processing plants with an investment of Rs. 10 crores each. While one of them will be located in Bangalore, the site for others are yet to be finalised.  
(Financial Express 15 April 1990, 7)

## Personalia

Nil



## Nutritional Aspects of Palm Oil

Y.H. Chong

Palm olein is now being imported on a fairly large scale and is being widely consumed in India. This paper attempts to briefly summarise the available knowledge regarding its nutritive value.

The oil palm *Elaeis guineensis* has its origin in West Africa. It is now planted commercially not only in West Africa but also in Central and South America, S.E. Asia and Papua New Guinea.

Palm oil is derived from the mesocarp of the fruit of the oil palm and should not be confused with palm kernel oil which is derived from the endocarp or kernel.

Palm oil has had a long history of food usage. The writings of early European explorers to West Africa, dating some 500 years before, mentioned its food use, while archaeological evidence indicated its availability as far back as 5,000 years ago<sup>4</sup>.

Malaysia is now the major producer and exporter of palm oil. Malaysian palm oil is now exported to well over 60 countries throughout the world for both food and non-food uses.

As food, processed palm oil, particularly in the form of the liquid fraction RBD palm olein is now increasingly used as a source of cooking oil. Processed palm oil is also widely used in margarine, shortening, vanaspati and a variety of food products.

Despite its long history and wide food applications, there is still a considerable lack of understanding on the nutritional aspects of palm oil mainly because of its grouping as a saturated fat, attributing to it a harmful cholesterol-raising effect.

### Chemical composition of palm oil:

The fatty acid composition of refined palm oil and RBD palm olein is given below<sup>1,2</sup>:

Fatty Acid	Refined Palm Oil % of the total	RBD Palm Olein
12:0	0.2	0.2
14:0	1.1	1.0
16:0	44.0	39.8
18:0	4.5	4.4
18:1	39.2	42.5
18:2	10.1	11.2
18:3	0.4	0.4
Total Saturates	49.8	45.4
Total Unsaturates	49.7	54.1

Of its unsaturates, about 40 percent consists of the 18:1 monounsaturated and 10 percent of the EFA 18:2 fatty acid.

Like all other vegetable oils, palm oil also does not contain cholesterol. Refined palm oil provides a good source of vitamin E, while crude palm oil is also the richest known source of beta-carotene<sup>7</sup>.

**Effect on blood levels of cholesterol:** Contrary to expectations, recent human feeding experiments with palm oil enriched diets have shown that not only does palm oil not raise the levels of blood cholesterol and LDL, its effects are comparable to the more unsaturated oils. Indeed, palm oil appeared hypocholesterolemic when compared to other sources of saturated oils and fats.

Some of the recent findings on the effects of a palm oil enriched diet on human volunteers are as follows<sup>3</sup>.

- G. Hornstra *et al* from Maastricht demonstrated that the maximal replacement of the habitual fats in the Dutch diet with palm oil in a group of 40 male volunteers (in a double-blind crossover design consisting of two periods of six weeks' feeding) had no significant effect on blood cholesterol. The levels were 190.0 mg/dl for Dutch fat blend and 190.8 mg/dl for palm oil diet. In contrast, the palm oil diet caused a significant increase in the beneficial HDL-cholesterol and a significant reduction in the LDL-triglycerides.

- T.K.W. Ng *et al* compared the effects of diets containing palm olein, corn oil and coconut oil in three groups of student volunteers in Malaysia in the following dietary sequence:

- Group I : Coconut-palm-coconut (n = 27)
- Group II : Coconut-corn-coconut (n = 26)
- Group III : Coconut oil-coconut oil-coconut oil (n = 27)

Each dietary fat was eaten for five weeks at 37 energy percent fat of which the test fats comprised 85 percent of the total fat.

In Group I, palm olein consumption following coconut oil feeding caused a

mean serum cholesterol reduction of 36 mg/dl ( $191 \pm 50$  mg/dl during coconut oil period and  $155 \pm 34$  mg/dl during palm olein period). For Group II, corn oil feeding following coconut oil reduced serum cholesterol by a mean of 51 mg/dl ( $190 \pm 38$  mg/dl during coconut oil period and  $122 \pm 23$  mg/dl during corn oil period) whereas serum cholesterol levels for Group III subjects who were fed a coconut oil diet throughout, remained significantly higher at around 190 mg/dl. The levels of serum cholesterol at entry for all the three groups were around 170 mg/dl.

- Shafiq Ahmad Khan *et al* fed four groups of human volunteers in Pakistan diets enriched with one of the following fats: refined palm oil, butter ghee, vanaspati or hydrogenated cottonseed oil. Each diet was consumed for 60 days.

After completion of the first 60 days' feeding, the groups underwent a 10-day "washout" period, after which the groups interchanged dietary fats, each of which was consumed for another 60 days. Thus the same dietary fat was consumed over two separate 60-day feeding periods by two different groups of volunteers.

On both the 60-day feeding periods during which the palm oil diet was fed, the levels of serum cholesterol were reduced by 13 and 15 percent compared to the period of entry. A similar hypolipidemic effect was, however, not observed during the periods when butter ghee, vanaspati or hydrogenated cottonseed oil was consumed.

Several animal experiments have also demonstrated that a palm oil diet lowered blood cholesterol levels as opposed to sheep tallow, lard, the lauric oils and olive oil<sup>9,11,15,16,21</sup>.

Furthermore, K.C. Hayes recently reported that increasing the amounts of palmitic acid, the major source of saturated fatty acid of palm oil, by five-fold in the diets of three species of monkeys (cebus, squirrel and rhesus), not only did not raise blood cholesterol levels but total cholesterol actually declined by 22 mg/dl, from a mean of  $205 \pm 11$  mg/dl to  $183 \pm 9$  mg/dl<sup>3</sup>.

Hayes concluded that palmitic acid was neutral and went on to show that the Hegstead and Keys equations predicted the cholesterol response perfectly ( $r = 0.99$ ) when this new finding was taken into account<sup>3</sup>.

**Effect on blood clotting:** It is now increasingly recognised that arterial



thrombotic tendency is another important risk factor of coronary heart disease.

A palm oil diet was found to increase obstruction time of aorta loops of rats, reduce platelet aggregation, thereby reducing blood clotting tendency (anti-thrombotic)<sup>13,19</sup>.

Arterial thrombotic tendency is closely associated with the balance of two physiologically active chemical substances, thromboxane (TXA<sub>2</sub>) and prostacyclin (PGI<sub>2</sub>). TXA<sub>2</sub> is a very powerful platelet aggregating and vaso-constrictive substance that promotes clotting, while the effects of PGI<sub>2</sub> are opposite to that of TXA<sub>2</sub>. Platelet aggregation is inhibited by PGI<sub>2</sub> which also relaxes vessel tone.

The balance of TXA<sub>2</sub> and PGI<sub>2</sub> is thus very important in the maintenance of fluidity of the blood and it is known that people who suffer from coronary disease or diabetes have unfavourable TXA<sub>2</sub> to PGI<sub>2</sub> ratios that favour clotting rather than bleeding.

There are now a number of reports which show that a palm oil diet in animals either promoted the production of the anti-clotting prostacyclin or decreased the formation of the pro-thrombotic thromboxane<sup>3,5,9,13,19,21</sup>.

**Beneficial effects of palm oil vitamin E tocotrienols:** Palm oil is a very rich source of vitamin E and its content is comparable to that found in corn and soyabean oil. The predominant palm oil vitamin E are the tocotrienols which are the unsaturated analogues of tocopherol. Most commercial oils are devoid of tocotrienols, although tocotrienols are found also in rice-bran oil, wheat germ oil and the oil of barley and oats<sup>7,17,18</sup>.

Tocotrienols are now known to have a number of beneficial effects:

- suppress cholesterol production in the liver, thereby lowering blood cholesterol<sup>3,18</sup>
- reduce the tendency of blood to clot<sup>3</sup>
- give protection to certain types of experimental cancers<sup>3,14</sup>
- act as natural antioxidants, scavenging the damaging oxygen-free radicals now hypothesised to play a role in cellular aging and chronic degenerative diseases<sup>3</sup>.

**Conclusion:** While it is recognised that too much of any type of fat is undesirable particularly in the affluent communities, the current call to reduce fat

intake seemed to have focused attention only on the reduction of saturated fats.

Not all saturated fats need to raise blood cholesterol<sup>20</sup>. Cocoa butter is a good example and now the evidence we have for palm oil is that although classified as a saturated fat, it poses no added risk to coronary heart disease and instead may perhaps even be protective.

The undue emphasis given to the saturates has detracted attention from the potential hazards of polyunsaturated fatty acids and their hydrogenated products.

There is now increasing evidence that excessive intake of polyunsaturates can result in gallstone formation, suppression of HDL and the immune response, cancer development and possibly even atherosclerosis itself through free-radical mediated lipid peroxidation and damage<sup>6,10</sup>.

Polyunsaturated oils are also seldom used as such and usually need to be hydrogenated producing trans isomers. The issue of the long term safety of trans isomers is still unsettled<sup>8</sup>. Trans-fatty acids are known to inhibit the activity of enzymes involved in essential fatty acid and prostaglandin metabolism and are also known to adversely affect the reproductive performance of animals<sup>12</sup>.

In the final analysis, one must recognise that there is really no single ideal source of dietary fat. We need to obtain a balance of saturates, monounsaturates and polyunsaturates in the ratio of 1:1:1 and preferably with even a less than one ratio of polyunsaturates. Such a balance can only be obtained from a combination of dietary fat sources and by choosing our food from the widest range and varieties possible.

On the basis of present knowledge regarding EFA requirements and desirable fatty acid balance in the diet, it appears that the incorporation of palm oil in the traditional diet of S.E. Asia (consisting of rice, fish, vegetables, legumes and their products) would be safe from the point of view of nutrition and cardiovascular health.

*The author, currently Senior Consultant in Nutrition, Palm Oil Research Institute of Malaysia, was formerly Chief of Nutrition Division of Institute of Medical Research, Kuala Lumpur Malaysia*

#### References

1. Malaysian Palm Oil, Chemical & Physical Characteristics. PORIM Technology, No. 6, 1981.
2. Oleins & Stearins from Malaysian Palm Oil, Chemical & Physical Characteristics. PORIM Technology, No. 4, 1981.
3. Proceedings 1989 PORIM International Palm Oil Development Conference (Nutrition Module), 5-9 September, Kuala Lumpur (in Press).
4. The Oil Palm. Hartley, C.W.S., Third Edition, Longman Scientific & Technical, 1988.
5. Abeywardena, M.Y. *et al.* Increase in Myocardial PGI/TXA Balance Following Long-Term Palm Oil Feeding in the Rat. *J. Molec. Cell. Cardiol.* 21, Supp. II, p599, 1989.
6. Ahrens, E.H. Jr. in 'Diet & Prevention of Coronary Heart Diseases'. Edited by B. Hallagren, Raven Press, N.Y., 1986, p81-111.
7. Barrie Tan. Palm Carotenoids, Tocopherols and Tocotrienols. *JAOCS* 66 : 770-776, 1989.
8. Booyens, J. & Louwrens, C.C. The Eskimo Diet - Prophylactic Effects Ascribed to the Balance Presence of Natural Cis Unsaturated Fatty Acids and The Absence of Unnatural Trans and Cis Isomers of Unsaturated Fatty Acids. *Med. Hypothesis*, 21 : 387-408, 1986.
9. Charnock, J.S. *et al.* Effects of Palm Oil Enriched Diet on Cardiac Arrhythmia and Thrombogenesis in a Rat Model. Paper presented at International Conference on Oils, Fats and Waxes, Auckland, New Zealand, 12-19 February, 1989.
10. Grundy, S.M. Effects of Fatty Acids in Lipoproteins in Man, in 'Health Effects of Polyunsaturated Fatty Acids in Seafoods'. Edited by A.P. Simopoulos *et al.* Academic Press, 1986.
11. Habidah Abdul Hamid, *et al.* Effects of Dietary Fats on Serum Lipids and Lipoproteins in Rats. Proceedings of 7th Federation of Asian and Oceania Biochemists Symposium, 28-30 November, Kuala Lumpur, 1988.
12. Hanis, T. *et al.* Effects of Dietary Trans-Fatty Acids on Reproductive Performance of Wistar Rats. *Br. J. Nutr.* 61 : 519-529, 1989.
13. Hornstra, G. Dietary Lipids and Cardiovascular Disease: Effects of Palm Oil. *Oleagineux* 43 : 75-81, 1988.
14. Kato, A. *et al.* Physiological Effect of Tocotrienol. *Yukagaku (J. Jap. Oil. Chem. Soc.)* 34 : 375-376, 1985.
15. Kris-Etherton, P.M. *et al.* Effect of Dietary Fat Saturation on Plasma and Hepatic Lipoprotein in the Rat. *J. Nutr.* 114 : 1675-1682, 1984.
16. Ong, A.S.H., Qureshi, N. *et al.* Effects of Palm Oil and Other Dietary Fats on Cholesterol Regulation in Chicken. The FASEB Journal. Abstract No. 7228, Volume 2, No. 5, 1988.
17. Qureshi, A.A. *et al.* - Personal Communication.
18. Qureshi, A.A. *et al.* The Structure of an Inhibition of Cholesterol Biosynthesis Isolated from Barley. *J. Biol. Chem.* 261 : 10544-10550, 1986.
19. Rand, M.L. *et al.* Effects of Dietary Palm Oil on Arterial Thrombosis, Platelet Response and Platelet Membrane Fluidity in Rats. *Lipids*, 23 : 1019-1023, 1988.
20. Reiser, R. Saturated Fat in the Diet and Serum Cholesterol Concentration : A Critical Examination of the Literature. *Am. J. Clin. Nutr.* 26 : 524-555, 1973.
21. Sugano, M. One Counterargument to the Theory that Tropical Oils are Harmful. *Lipids (Japanese)* 40 : 48-51, 1987.



READY FOR RELEASE .....

"Directory of Indian Processed Food and Allied Industries"

Listing over 4000 major food processors/exporters and their products manufactured in the area of fruits, vegetables, cereals, dairy, fish, meat, poultry, oilseeds, nuts food additives, packaging, etc.etc.

Plus

Information on Food Laws and Regulations, financing, licensing and quality control agencies, training organizations, R&D agencies.

*and*

an Index of range of products, flavours and additives available in the country.

An invaluable guide to one and all in the area of *food processing*

Price: Rs.500/- (Packing & Forwarding charges extra Rs.25/-)

D.D./Cheque/M.O. to be drawn in favour of Director, CFTRI, Mysore. Please add Rs.10/- towards bank collection charges for outstation cheques.

For copies, write to:

The Sales and Distribution Officer, FOSTIS,  
CFTRI, Mysore - 570013.



## Index

acetaldehyde, flavour additive 13  
agro products export,  
  registering office, new 129  
alcohol production 139  
anti-cholesterol compound  
  sugarcane 79  
aroma estimation, new rice 103  
ascorbic acid  
  treatment for fish, frozen  
  preservation 71  
basmati rice export price 119  
beverage industry pumps 99  
bottle washing machine 92  
bread unit  
  by Modern Food Industries 158  
cans, OTS, by Asian Can Ltd., 157  
cashew export, CCS 120  
cashew kernels export 121  
cereal consumption pattern 140  
cholesterol reduction, by flea  
  (Psyllium) seed 67  
cholesterol removal, dairy  
  products 75  
cocoa beans, liquid  
  roasting 77  
coffee consumption for work  
  efficiency 147  
coffee export 124  
consumption of cereal pattern  
  140  
cup filling machine, rotary 91  
dairy products, cholesterol  
  removal 75  
decorticator  
  for groundnut 87  
  for sunflowerseed 86  
dehumidifier/air dryer 93  
dehusking machine, pulse 83, 84  
double drum dryer 96  
dryer  
  double-drum 96  
  tray type 94  
drying system, low  
  temperature 95  
edible oil import 132  
egg production 110  
evaporator, liquid-liquid  
  separation 89

excise rebate, oils, for  
  non-conventional oils use 138  
excise relief, food processing  
  industry 137  
export  
  basmati rice 119  
  cashew kernels 121  
  CCS for cashew 120  
  coffee 124  
  gingelly seeds 116  
  jaggery, new norms 122  
  marine products 126  
  oils, solvent extracted 115  
  oilseeds 113  
  oilseeds extraction 114-115  
  onion 123  
  rice 118-119  
  shrimp 127  
  spices 117  
  tea 125  
export documents simplified 130  
extractions, oilseeds, export 114  
extruder, soybean snack 85  
filling machine for cup 91  
fish, frozen, ascorbic acid  
  preservation 71  
fish waste, recycling 82  
flavour additive, acetal-  
  dehyde 73  
flea (Psyllium) seed,  
  cholesterol reduction 67  
flexible packaging film 101  
flow meter for food processing  
  industry 88  
food additives, categories 74  
food belts, polymers 98  
food irradiation 145  
food processing industry  
  excise relief 137  
  flow meter 88  
  growth/development  
  scheme 142  
  Italian co-operation 152  
  progress 141  
  West German technology 151  
food technology,  
  world's top achievements 135  
foods, high pressure  
  processing 70  
foods, processed, CCS 128

- Frozen, fish, preservation,
  - ascorbic acid treatment 71
- Fruit drinks,
  - tetrapack ban 146
- Fruit,
  - freshness retention, zinc chloride 68
  - vapour treatment for longer shelf-life 69
- Genetic engineering
  - Gazette notification 143
- Gingelly seed, export 116
- Glazing limit, shrimp 149
- Grapeseed oil, new oil
  - source 66
- Groundnut
  - decorticator 87
  - protection, inert clay dust 72
- Import
  - edible oil 132
  - palmolein oil 131
  - sugar 133
- Indian Standards on Food, new 144
- Inert clay dust,
  - groundnut protection 72
- Irradiation of food 145
- Jaggery export, new norms 122
- Kneader (mixer) for high viscosity 97
- Low temperature drying
  - system 95
- Liquid-liquid separation
  - evaporator 89
- Liquid roasting, cocoa
  - beans 77
- Marine products export 126
- Meat products processing,
  - joint venture 150
- Mixer (kneader) for high viscosity 97
- Oil
  - edible, import 132
  - grapeseed, new oil source 66
  - rice bran, production 107
  - vegetable, production 108
- Oils,
  - non-conventional, excise rebate 138
  - solvent extracted, production 115
  - vegetable, availability 106
- Oilseeds
  - export 113
  - production 104-105
- Oilseeds extractions, export 114
- Omelettes, production plant 78
- Onion export 123
- Packaging film, flexible 101
- Packaging (retort) system,
  - new aluminium foil 102
- Palmolein, import 131
- Pan masala statutory
  - warning 148
- Pickles manufacturing unit
  - in Iraq 155
- Pouch sealing machine,
  - rotary 90
- Pressure (high) processing
  - foods, 70
- Production
  - alcohol 139
  - egg 110
  - oils, solvent extracted 115
  - oilseed extractions 115
  - oilseeds 104-105
  - rice bran oil 107
  - shrimp 109
  - soft drinks, 112, 134
  - sugar 111
  - vegetable oil 108
- Production plant, omlettes 78
- Pulse,
  - dehuller-cum-splitter 84
  - dehusking machine 83
- Pulveriser 100
- Pumps for beverage industry 99
- Ready-to-eat food,
  - by Ambuja Flour Mills Ltd 154
- Retort packaging system,
  - new aluminium foil 102
- Rice (new) aroma
  - estimation 103
- Rice bran oil production 107
- Rice export 118, 119
- Roasting (liquid), cocoa
  - beans 77



Sealing machine for pouch 90  
 Crimp  
 export 127  
 glazing limit 149  
 production 109  
 Snack, soybean, extruder 85  
 Snack food plant by  
 Reliable Foods 156  
 Soft drink  
 production 112, 134  
 from waste whey 80  
 Soybean snack extruder 85  
 Spices export 117  
 Straw  
 for xylitol production 81  
 Sugar  
 import 133  
 production 111  
 Sugarcane anti-cholesterol  
 compound 79  
 Sunflowerseed decorticator 86  
 Tea export 125  
 Tetrapack ban 146

Tray type dryer 94

Vanaspati  
 capacity expansion 136  
 production, new process 76  
 project by Suraj Vanaspati  
 Ltd., 153  
 Vapour treatment, fruits,  
 shelf-life 69  
 Vegetable oil,  
 availability 106  
 production 108

Washing machine for  
 bottles 92  
 Waste (fish), recycling 82  
 Whey, waste, soft drink  
 production 80

Xylitol from straw 81

Zinc chloride, retention  
 of fruit freshness 68

#### ADDENDUM

Food Digest Vol.13, No.1, Jan-March 1990.

In the contents page, item No.14 may be  
 read as - "Special Article - Pan Masala:  
 Present Status.

The special article - "Pan Masala: Present  
 Status" has been reprinted from Nutrition  
 News, November 1989 issue.



**NATIONAL INFORMATION CENTRE FOR  
FOOD SCIENCE AND TECHNOLOGY  
CFTRI**

*Also subscribe to our other periodicals*

**1. FOOD TECHNOLOGY ABSTRACTS**

(Monthly)

This current awareness service covers worldwide information in the area of Food Science and Technology, Nutrition and allied fields culled out from over 400 core periodicals, published in India and abroad. Mainly intended for the R&D personnel.

Annl Subn: India	Rs. 250/-
Foreign	\$ . 85/-

**2. FOOD PATENTS (Quarterly)**

Give world patent information on Food Science and Technology taken from national and international sources. Abstracts area provided for food patents registered in India.

Annl Subn: Indian	Rs. 100/-
Foreign	\$ . 50/-



**NATIONAL INFORMATION CENTRE FOR  
FOOD SCIENCE AND TECHNOLOGY  
CFTRI**

*Also subscribe to our other periodicals*

**1. FOOD TECHNOLOGY ABSTRACTS**

(Monthly)

This current awareness service covers worldwide information in the area of Food Science and Technology, Nutrition and allied fields culled out from over 400 core periodicals, published in India and abroad. Mainly intended for the R&D personnel.

Annl Subn: India	Rs. 250/-
Foreign	\$. 85/-

**2. FOOD PATENTS (Quarterly)**

Give world patent information on Food Science and Technology taken from national and international sources. Abstracts area provided for food patents registered in India.

Annl Subn: Indian	Rs. 100/-
Foreign	\$. 50/-



Regd. No. 36762/84

Printed and published by Dr.B.L.Amla, Director, Central Food Technological  
Research Institute, Mysore 570 013, at CFTRI Printing Press.  
Editor: Shri K.A.Ranganath, CFTRI, Mysore.









# FOOD DIGEST

Vol.13 No.3  
July - Sept. 1990



National Information Centre for Food Science and Technology  
Central Food Technological Research Institute,  
Mysore - 570 013, India



Annual Subscription: Rs. 150.00, US \$ 65.00, Single copy: Rs.40.00

## CONTENTS

1. Raw Materials	....	95
2. Storage and Infestation Control	....	96
3. Food Additives	....	98
4. Processes	....	99
5. Byproducts and Waste Utilization	....	-
6. Processed Products	....	102
7. Equipment and Machinery	....	103
8. Packaging	....	109
9. Analysis	....	111
10. Commercial Intelligence	....	112
11. Food Regulation, Quality Control & Hygiene	....	142
12. Transfer of Technology & New Industries	....	152
13. Personalalia	....	-
14. Special Article -		
The BVO Story	....	153

Index





## Raw Materials

### 159 Tomatoes grown on salty soil

Scientists are finding new crops grown on salty soil and irrigated with salt water that may be useful in third countries with long ocean shorelines and scarce fresh water.

The U.S. National Research Council has just published the results of a four-year study of hundreds of plants that can tolerate salt. The report was prepared by a panel set up by the Council's board of science and technology. Seeds from a wild tomato found on the seashore of Ecuador's Galapagos islands produced small and bitter tomatoes. But when crossed with commercial tomato, tasty fruits were obtained in 70 per cent seawater.  
(The Hindu 29 May 1990, 5)

### 160 Tobacco as a protein source

Protein extracted from tobacco leaves is better for human consumption than egg white, cheese or milk, says Shuh Sheen, a professor of plant pathology at the University of Kentucky. The fibrous residue left after the extraction of the protein would also make safer cigarettes than ordinary tobacco, because burning protein generates nitrogen oxides, cyanides and carcinogens. However, "there's no such thing as a safe cigarette".

This protein has a more balanced mixture of essential amino acids than many other foods. With intensive cultivation, an acre of tobacco can yield over 200 kilograms of the tasteless, odourless protein. Processing also yields other soluble protein, fibre, and a mixture of starch and insoluble protein, plus a liquid residue that represents most of the original biomass. Nicotine ends up in the liquid, which can be used as fertiliser; the nicotine is toxic to insects.

(New Scientist 9 June 1990, 39)



## Storage and Infestation Control

### 161 Microwave technology

Microwave technology has been used to revolutionise pasteurisation and food preservation. Today microwaves have entered the American kitchen. Microwave ovens are now found in 60 million American homes. These days microwave ovens are doing more than just thawing frozen dinners and quick cooking.

The key to the heating ability of microwaves is the water molecule's dipolar structures. Alternating electro-magnetic waves keep charged water molecule spinning. The resultant friction creates heat, which is passed to neighbouring molecules.

Researchers are now learning how to use microwaves to sterilise food and give it a shelf-life measured not in days, but in years. At the Kraft General Foods Laboratory in Tarrytown, New York, physicist Charles Buffler is trying to use microwave technology to revolutionise pasteurisation. 'From the consumer's point of view' he says 'there would be no difference between microwave and standard pasteurisation. It is a simple heat time relationship. You need to heat the food at 185 F for 3 mins. It does not matter how'.

The challenge facing the food engineers is the same one that a home cook faces when trying to heat milk without burning it at the bottom of a saucepan - it must be heated evenly. To ensure that food gets evenly exposed, the conventional pasteurising chambers have complex arrays of pipes filled with hot water or steam that releases heat over, say jars of pickled beets as they move past on conveyor belts. Pasteurisation can take as long as 30 mins.

With a set-up akin to a giant microwave oven, researcher Buffler hopes not only to speed up the pasteurisation process but to take it one step further - to sterilisation. Pasteurisation does not kill all the bacteria. In contrast, sterilisation kills almost every harmful microbes the food may contain. When sealed in air-tight pouches whatever you sterilise will no longer need refrigeration.

To kill all the bacteria, the food's temperature must be raised to 250 F for 3 mins. Conventional methods, however raise the temperature so slowly that by the time the food is sterilised, it is also mushy. The procedure works for food items like stews. In fact, General Foods is now test marketing in USA its first line of sterilised stews - in a pouch. Researchers hope that with microwaves they will be able to achieve high-tech TV dinners that need no refrigeration but still keeps the veal tender, the carrots crunchy. In another 20 years or so, they predict the freezer section in supermarkets may all but disappear.  
(Chemical Weekly 35(39), 1990, 91-92)



## 162 Nitrogen freezing for better yield of crab meat

Tests carried out in the USA, it is reported, have demonstrated that freezing crab with nitrogen can produce a more moist, less salty product than the brine frozen product. The crab is also said to have a fresh flavour. The nitrogen frozen crab meat was not only found more moist, but also less fibrous in texture. The cost of nitrogen freezing in the USA is estimated to be between \$ 0.03 and \$ 0.05 per pound of crab meat. Nitrogen-frozen crab meat is already being sold by a Japanese company in the domestic market. Nitrogen freezing of crab meat has not yet become popular in Europe or the USA. The US seafood industry, it is reported, will soon adopt nitrogen freezing of crab meat.

(Seafood Export Journal 22(4), 1990, 32)

## 163 Cassava preservation technique

Cassava, which can usually be kept fresh for only two weeks after harvest, is being sold in shops in Colombia and Ecuador. The cassava has neither been frozen nor cooked but a new process has rendered it safe to be kept on the shelf ready for use. Normally, cassava becomes unacceptable for eating soon after it has been harvested, which makes it very difficult for small farmers to market.

Some years ago, the International Centre for Tropical Agriculture (CIAT) and the Overseas Development and Natural Resources Institute (ODNRI) developed a way of conserving cassava by putting it in polythene bags and treating it with a safe, thiabendazole fungicide. The roots need to be treated quickly, which means the procedure is well suited to small farmers and farmer cooperative.

Although the technique worked, it has to be taken to the market place and a marketing programme developed. Starting in one of the major cassava markets in Colombia, market preferences were ascertained. Within a short time 10 tonnes a month were being sold and sales have now spread to other areas.

In one area a farmers' cooperative negotiated an agreement with a shopkeepers' association and within two months they made a profit of US \$ 1,200. A supermarket chain has the fresh cassava delivered in 4 kg bags. So successful has the concept been in Colombia that a similar project has begun in Ecuador where fresh cassava is exported to the USA. There are plans for Paraguay to follow suit.

For details, contact: Centre for Tropical Agriculture (CIAT), Apdo Aéreo 67-13, Cali, Colombia.  
(Asia-Pacific Tech Monitor March-April 1990, 26-27)



## Food Additives

### 164 Super critical extraction for Indian spices

There is a tremendous market for Indian natural flavours, fragrances, natural colours and spice extracts in the Western developing countries, reports Mr. John Dean, an international expert in this field. According to Dean there is a great potential for the development of natural spices and plants in India for the export of their essences and fragrances. There is at present a great craze for natural products and India should take advantage of this craze.

From the Indian context, what seems to be most attractive is the processing of spices, oleoresins, natural colours and essential oils, since India is one of the largest spice exporters. Use of supercritical carbon dioxide to extract oleoresins/essential oils and colours from spices can become a stepping stone for India in the field of supercritical extraction technology.

Supercritical CO<sub>2</sub> can be used to extract flavour components of spices to give spice extracts with natural composition with no solvent residue. Spices like pepper, chilli, nutmeg, etc., have been tried for supercritical extraction. Advantages from this type of extraction are: (a) greater uniformity of the product, (b) gives product free from microbial contamination and (c) high yield with higher quality obtained.

Supercritical fluid extraction also is of immense value in the extraction of natural colouring substances. Paprika presents an interesting challenge in this direction. The use of paprika oleoresin as a natural colouring agent in food is greatly hampered due to the presence of 'capsicine' which gives a hot, burning taste. Removal of capscisine from oleoresin requires temperature, which in turn reduces its colour value. However, the two stage extraction of dried paprika powder by supercritical CO<sub>2</sub> allows selective extraction and effective separation of capscisine from red colouring matter, giving good natural colour free from hot principles. In this manner, the method yields two high valued products: (a) hot principle to be used as flavouring extract, (b) good natural colouring matter and (c) high protein residue, a low value product, useful as an animal feed. (Chemical Weekly 35(34), 1990, 97)

### 165 New sweetener

Nutrasweet Co., a subsidiary of Monsanto and the leader in non-caloric sweeteners with their Aspartame K has taken the lead towards a new series of computer designed sweeteners. One of these based on beta amino acid (as against the normal alpha amino acids) is said to be 20,000 times sweeter than sucrose. They have evolved a rationally



planned research linked to computer models of molecular design for specific activity, on the lines of the drug industry. No more accidental products or serendipitous discoveries ?

Suosan lacked the large hydrophobic recognitor unit common to many high potency sweeteners. Based on this finding a series of better Suosan related sweeteners have been developed -- based on beta alanine.

They have taken up design of new sweeteners that would be absolutely safe in terms of longterm toxicity of the sweetener as well as its metabolism. A better understanding of biological message transduction is expected to lead to many more.

(Chemical Weekly 35(41), 1990, 43)

#### 166 Fat substitute

Monsanto Chemicals report the approval of FDA for their new fat substitute compound termed "Simplease". The fat substitute product is a proprietary blend of non-fat milk and egg whites and is not a synthetic product. "The ingredients are heated and sheared in a microencapsulation technique that results in miniscule spheres that roll over one another to produce the rich taste and texture associated with fats". The Food and Drug Administration stepped in and forced the product for approval to be certified as "Generally Recognised as Safe" ingredient.

It will be of low caloric input and avoids the cholesterol problems associated with fats. FDA is to give approval of specific products containing simplease and presently ice cream has such approval. A four ounce serving has only 1 gram of fat as against 15 grams of butter fat in regular ice cream. Consumer acceptance is now awaited for generating a big market. Future product lines with simplease are salad dressing, mayonaise, cheese etc. Similar products by others for use in cooked foods are also awaiting FDA approval.

(Chemical Weekly 35(32), 1990, 44)

### Processes

#### 167 A new method of making vanaspati

Researchers in Calcutta have reported success with a new process of making vanaspati from vegetable oils by inter-esterification, which offers several advantages over the conventional hydrogenation process.



Not only is hydrogenation an energy-intensive process, but it also leads to the formation of many trans-unsaturated acids, including the transisomeric acid of the essential fatty acid linoleic acid, which is undesirable from the health point of view.

Researchers at the department of chemical technology, university of Calcutta, studied the efficacy of a new process involving inter-esterification of glycerides, which is employed in some of the developed countries to produce margarine and shortenings from liquid oils.

Using a number of liquid oils as such or in combination, they found that the inter-esterified products were comparable to vanaspati prepared by hydrogenation, as far as the nutritional quality was concerned.

The Calcutta researchers studied two kinds of esterifications - random and directed. The ester-ester interchange is random when the natural oils become oriented in their glyceride pattern so that the composition of the glyceride becomes identical to that obtained by esterifying glycerol with fatty acids.

They report that sal oil can be inter-esterified with cottonseed oil and sunflower-oil and mowrah with rice bran oil to yield products similar to vanaspati. Also, palm oil and its fractions can be better utilized in the inter-esterification reaction than hydrogenation.

The investigators further point out that if the inter-esterification is carried out in the presence of a catalyst, then the fatty acid distribution cannot be specific, making the process unsuitable for products like cocoa butter. However, enzymatic inter-esterification is better than conventional catalytic process.

The inter-esterification process has recently been included by the Central Committee of Food Standards (PCB).  
(P.T.I. Science Service 9(8), 1990, 5)

## 168 Mass-producing low fat butter

APV has recently acquired world-wide rights to a unique process for the manufacture of low fat butter. Introduced to the Swiss market early in 1989, this low fat butter was a great success. In comparison with other processes, this special technique uses raw butter as a base adding only those ingredients found naturally in milk. Many manufacturers add emulsifiers and preservatives to stabilise the product. In this new process only caseinates, lactic acid and water, all natural constituents of milk are used.

Low fat butter, produced by the new process, has a fat content of 40%, where as in normally produced butter, the fat content can be as high as 80% to 85%. Consequently, both the calorific value and the cholesterol level are reduced to less than half. Tasting just like ordinary butter, the new low-fat butter spreads easily straight out of the refrigerator.



APV has improved the basic process, making it continuous and therefore, more suited to industrial scale production. It is now available as a standardised unit operation with a maximum capacity of 1200 kgs per hour. Already, two plants, worth approximately 650,000 have been sold to W.Germany.  
(Chemical Weekly 35(39), 1990, 89)

#### 169 Substitute of brominated vegetable oil

Researchers in Delhi claim they have found a non-toxic substitute for brominated vegetable oil (BVO) which has become the focus of public interest in recent times because of the government's ban on the use of BVO.

Brominated vegetable oil is used as an important ingredient by soft drink manufactures to produce a clouding effect in their products.

However it became the centre of a controversy when researchers found that it could cause cancer, and the Government of India banned its use with effect from April 15 this year.

The Shriram Institute of Industrial Research (SRI), New Delhi, now reports that its scientists have successfully developed a non-toxic substitute for BVO using chemicals that have been approved by the Prevention of Food Adulteration Act (PFA).

The new formulation is based totally on indigenously available chemicals and has given "highly satisfactory" results during trials.

It imparts a good stability to the soft drinks, without having any side effects. It has also been found to be superior to other known substitutes of BVO like Ester gum.  
(P.T.I. Science Service 9(9), 1990, 4)

#### 170 New light on enzymatic production of starch from corn

The steeping step in the semiconductors process for making starch from corn varies from 36 to 60 hours, depending on the type of corn. That is substantially longer than all subsequent steps.

Adding phytic acid degrading enzymes (Econase Ep 434) together with plant cell wall degrading enzymes to the steep liquor reduced steeping time considerably. The use of enzymes also resulted in a higher yield of the starch and lower energy consumption.  
(Chemical Weekly 35(35), 1990, 93)



## Byproducts and Waste Utilization

-Nil.

## Processed Products

### 171 Capacity Utilization of some selected processed food products

Product	1984-85	1985-86	1986-87
Biscuits	89	91	93
Confectionery	66	63	72
Bread	157	98	73
Soft drinks	62	56	57
Malt extracts	51	59	62
Pearl Barley	9	12	16
Cornflakes	18	19	22
Guar gum	72	61	63
Weaning food	48	91	92
High protein food	54	52	53
Starch	55	50	53
Liquid glucose	43	47	49
Dextrose	47	71	63
Anhydrous dex	38	55	55
Enzymes	10	14	15
Drinking chocolates	23	18	24
Chocolates	64	85	89
Cocoa powder	31	35	38
Processed fruits and vegetables	37	41	38

(Productivity 30(4), 1990, 473)

## 172 Comparative yield of finished products

Product	Raw Material per tonne of Finished Product (Tonne)	
	India	Other Countries
Orange Juice Concentrate (64 Brix)	14	10 (Brazil)
Pineapple juice Concentrate (65 Brix)	16	8 (Phillipi- nes, Hawaii)
Tomato Paste Concentrate (28 Brix)	7	4 (Italy)

(Productivity 30(4), 1990, 476)

## Equipment and Machinery

## 173 Rotary cone dryer

This is very useful for uniform and low temperature drying of heat sensitive chemicals. It has a double conical vessel with rotating system and vacuum solvent recovery system. This equipment being rotating, there is no charring or retention of product. One can change the product at will. This equipment rotates at very low speed (5 to 15 RPM) resulting in less wear and tear and requires very little maintenance. This can be used for crystalline products, granules in chemicals, and in food industries. The range is from 250 to 3,000 litres capacity. Features include: totally sealed and protected from contamination; quick loading and unloading; fast drying; and energy saving.

For more details write to: Rifriends Engineering Works, W-73 MIDC Phase 11, Manpada Road, Dombivil (East), Maharashtra 421 203. (Chemical Products Finder 8(12), 1990, 93)



## 174 High speed hydro-jetting bottle washing machine

Master High Speed Hydro-Jetting Bottle Washing Machine is available in three sizes: 120-190 bottles/min, 150-250 bottles/min, and 240-320 bottles/min. Other capacities are built to suit the user's requirements. The machine is capable of automatic intake of bottles, inverting them, and passing them through a series of jet washes. The machine can be offered with stages for pre-wash, hydro-wash, warm-wash, pre-final wash, and for reverting the dry air washed bottles to their original upright position prior to automatic discharge onto an outlet conveyor. Suitable tanks for recycling the hydro and warm washes as well as blower for blow drying are provided.

For more details write to: The Master Mechanical Works Pvt Ltd., Pushpanjali, S.V. Road, Santa Cruz (W), Bombay-400 054.  
(Chemical Products Finder 8(11), 1990, 16)

## 175 Pouch sealing machines

Sealers India manufactures sealing machines. Several models are available, which come in impulse as well as continuous types. Impulse sealers are used for sealing bags or pouches made of virgin films like polyethylene, PP, HMHD, and thin PVC films. Continuous type sealers are used for bags or pouches made of laminated materials like polyester poly, metallized polyester, laminated aluminium foil, and multi-layer films. The machines are available in hand operated (light and heavy duty), foot operated, and pneumatically operated models. Machines are also custom built.

For more details write to: Sealers India, No.7 & 8, Mugappair Road, Padi, Madras 600 050.  
(Chemical Products Finder 8(12), 1990, 74)

## 176 Oil expeller

The Mechanical Engineering Research and Development Organisation (MERADO), Ludhiana, has designed and developed a double-chamber modern oil expeller (10 tonnes per day capacity) under the Technology Mission on Oilseeds.

Trials conducted on the prototype expeller with mustard seeds have given repeatable results of 5.8% residual oil in cake in one-go crushing of the oilseeds. The throughput of the machine has been recorded up to 12 TPD (500 kg/hr). In comparison, conventional single-chamber expellers require four successive crushings of the seeds even to achieve about 7.5% residual oil in the cake.

The advantages of a MERADO expeller compared to the conventional one (33" x 6" dia) are as follows: 1.5 to 2 per cent extra oil recovery, the quality of oil conforms to BIS specifications and the cake is bright green without any discolouration.



A number of trials have been conducted on the prototype expeller with a view to determining optimum process parameters for oil extraction. Optimum working parameters such as moisture and temperature of the seed at various points, time of cooking, etc., have been established to achieve the highest recovery of quality oil and acceptable cake. Design parameters have been optimised to achieve high performance.

For further details write to Mechanical Engineering Research and Development Organisation, Gill Road, Ludhiana 141 006.  
(The Oils and Oilseeds Journal 42(4-6), 1989, 70)

#### 177 Rotary screen grain cleaner

Carter-Day International, Inc, USA offers a wide range of machines for cleaning, drying, sizing, and grading of agricultural products. Carter rotary screen grain cleaner is a versatile separator suitable for virtually any screening operation - scalping, aspirating and sifting grain for market, pellets, rolled grain, raw grain for feed, wheat flour, and other needs. The varied combinations of deck sizes and screen arrangements permit a range of optimum cleaning capacities from 25 T/hr to 400 T/hr.

For further information write to: Maharashtra Hybrid Seeds Co. Ltd., Arya Plaza, 1st Floor, Opp Uma Theatre, Chamrajpet, Bangalore, Karnataka-560 018.  
(Industrial Products Finder 18(7), 1990, 215)

#### 178 Vacuum drum filter

This filter is used in chemical, food, dyes, pharmaceutical industries. The heat transfer is effective and cost of operation is less. Process is continuous. One can use this filter in many industries including food processing (dextrose, glucose, protein hydrolysates, winterised palm oil, fatty acids); and wastewater treatment (flyash, gypsum, industrial wastewater).

For more details write to: Bifriends Engineering Works, W-73, MIDC Phase II, Manpada Road, Dombivli (East), Maharashtra 421 203.  
(Chemical Products Finder 8(12), 1990, 69)

#### 179 Continuous rice puffing machine

Puffed Rice is widely consumed in our country, especially in the villages. Considered to be the poor man's diet, it is a cheap and ready-to-eat food. It is liked for its colour, flavour, crispness and taste.

Puffed rice is traditionally prepared by sand roasting of pre-conditioned rice. The process is tedious and time consuming. The maximum output attainable by this method is only about 2.5 kg/hr. Being sand roasted, the sieved puffed rice contains some traces of sand which makes it uncomfortable to eat and is injurious to health.



Inspite of its shortcomings, the traditional method has survived since ages, and no alternative/technology is yet available.

A simple rice puffing machine based on the principle of hot fluidized bed has been developed. Preconditioned rice is fed in a continuous flow to a vertical column of hot air bed. The air velocity is so maintained as to keep the rice grains under suspension. Once the rice is puffed it travels upward due to its low density and is collected through a cyclone separator. To save energy the hot air from the cyclone separator is recirculated. The operation is fully automatic.

The hot air can be obtained by means of electric heaters, gas burners or an oven fueled by agricultural waste. The electric blower can be replaced by a manually operated blower. The technology is simple, easy to operate and gives puffed rice fully free of impurities.

Comparing the energy required for puffing, the new process has been found to use 50% less energy than the traditional one.

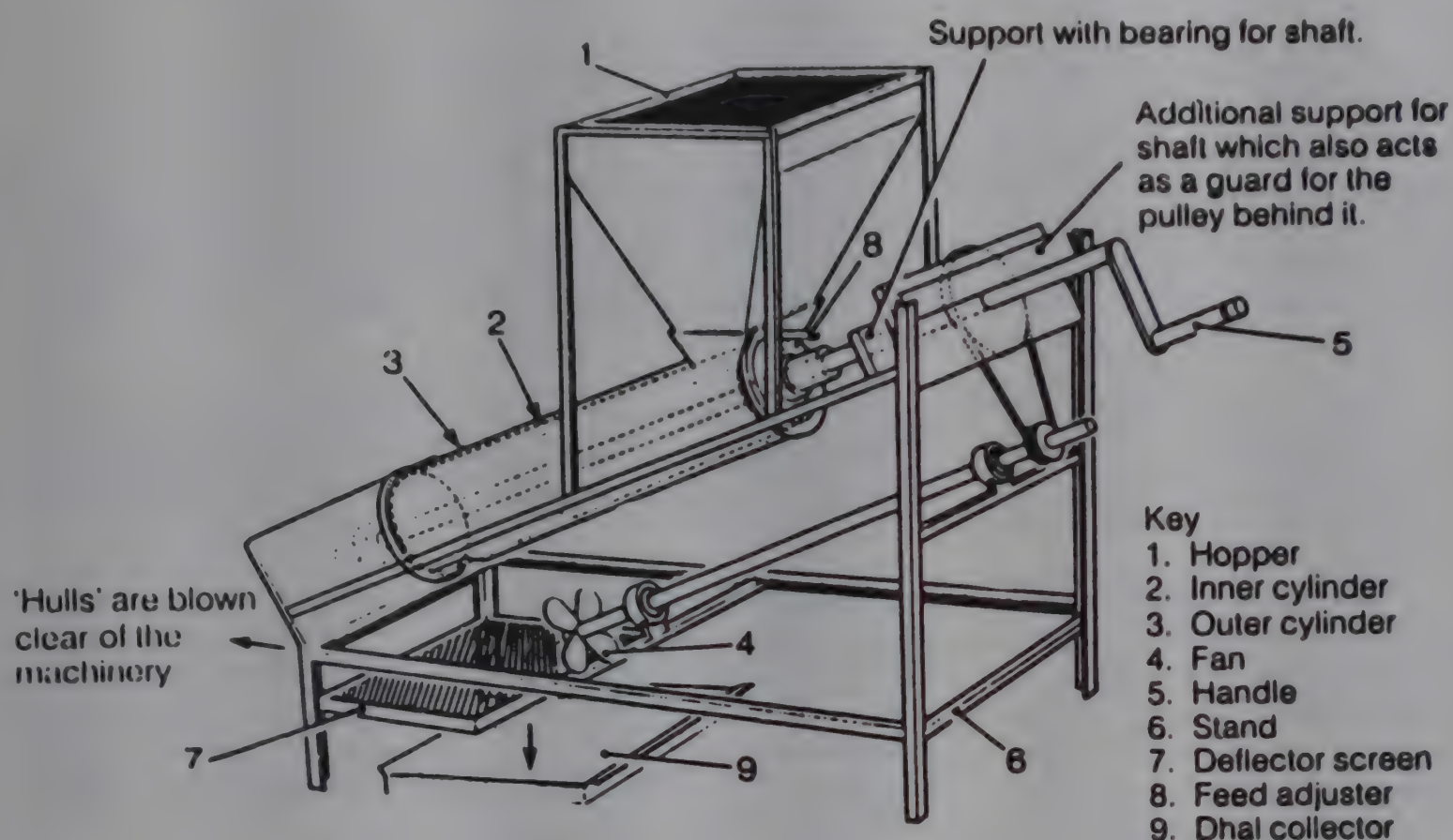
The present laboratory model has a capacity of 25 kg/hr. However, it can be scaled up for higher capacities according to the requirements of the industry.

For details, write to: Dr. P. R. Chandrasekhar, Dr. P. K. Chattopadhyay, Post Harvest Technology Centre, Indian Institute of Technology, Kharagpur - 721 302. India.

## 180 Soya Bean dehuller

Soya beans are valuable for the quantity of protein (40 per cent) and oil (20 per cent) they contain. In addition, soya beans contain protein of high quality, so they are of great importance to people who rely on plant materials for their protein. In order to popularize soya products, India's Central Institute of Agricultural Engineering have developed a simple dehuller which can be easily fabricated by village artisans.

The equipment consists of two concentric cylinders, a driving mechanism, a blower fan and a feeding hopper. The cleaned whole soya bean is fed through the hopper between the two concentric cylinders. The inner cylinder is made to rotate manually with the help of gears while the outer one remains stationary. The clearance between the cylinders is maintained at 75 per cent of the average soyabean grain size and the slope is  $19^\circ$ . There is a gradual decrease in the clearance from feed inlet to discharge outlet, i.e. from 10 mm to 7 mm. Shear and frictional forces imparted by the inner cylinder help in dehulling and splitting the soyabeans.



The mixture of hulls, 'brokens' and dhal (splits) flows out through the discharge outlet and falls onto the perforated deflector. The fan blows the hulls through the open end of the machine out onto the ground, clear of the machinery, and the 'brokens' fall through the perforated deflector. The splits free of hulls, slide over the deflector and are collected at the end.

The test conducted at the institute revealed that the overall dehulling efficiency is 95.5 per cent with 3-4 per cent 'brokens'. Dhal recovery achieved during the operation was however 84.5 per cent. It has a capacity of about 35 kg per hour. The cost of dehulling worked out to be Rs.0.13 per kg.



For details, contact: Central Institute of Agricultural Engineering (ICAR), Attn: Jaswant Singh and Lalan K. Sinha, Shri Guru Tegh Bahadur Complex, T.T. Nagar, Bhopal-462 003, India.  
(Asia Pacific Tech Monitor March-April 1990, 26)

# 181 A hand-operated rice and spelt wheat huller

There are several machine designs for hulling rice. One common design is the two rubber roller system, with each roller rotating in opposite directions and at different speeds. Hulls are slipped off the kernels when grains are passed between these two rollers. Another rice huller design is the horizontal abrasive disc system, using one rotating disc and one stationary disc.

The advantages of using rubber rollers are higher percentage of hulling, and less kernel breakage. The advantages of the abrasive disc system are ease of fabrication and repair of the abrasive surface when it wears out.

The I-Tech design, disclosed here, uses a vertical abrasive disc system (a hand-mill) to hull rice and spelt wheat. The advantage of using rubber surface is incorporated in this design by replacing the stationary disc with a gum rubber disc. The abrasive rotating disc remain unaltered. The replacement of the stationary disc with a rubber surface is not permanent, so the original purpose of the hand mill/grain grinder is retained.

The materials required are one steel washer, one sheet of gum rubber, cyanoacrylate glue and a hand-mill. The hand-mill and stone disc described here are available from R&R Mill Co of 45 West First North Street, Smithfield, UT 84335, USA (mention of company names/products is for benefit of the reader and does not imply endorsement by I-Tech).

This is how the system is to be used:

1. Remove auger and rotating disc from the hand-mill.
2. Remove stationary disc from mill by detaching three screws.
3. Determine the outside diameter of the stationary disc and obtain a suitable sized steel washer. The "Corona" and "Quaker City" handmills use a nominal 1-3/4 inch washer, which corresponds to 1-7/8 inch inside diameter and 4 inch outside diameter.
4. Drill and countersink three holes on the washer to mount it on to the grain mill.
5. Obtain a sheet of 1/8 inch thick gum rubber of sufficient size to cover the washer. Cut out a rubber disc with a hole to the shape of the washer. Rough up one side of the gum rubber and washer with a file. Remove oil and dirt from the rubber and washer surfaces with acetone, lacquer remover or paint thinner. Glue the rubber disc on to the washer with cyanoacorylate glue.



6. Bevel the inner edge of the gum rubber using a razor blade. Cut out mounting holes on the rubber disc.

7. Attach gum rubber + washer on to the grain mill. Insert auger and rotating disc on the mill.

The percentage of rice and spelt wheat hulled can be as high as 95% depending on the spacing between the stationary rubber disc and the rotating abrasive disc. Closer spacing increases hulling percentage and kernel breakage but decreases the hulling rate. Parallel discs with uniform spacing between them decrease the percentage of kernel breakage and unhulled grains. Well made hand-mills have bearings on both ends of the shaft and are able to maintain the discs parallel.

The described rice and spelt wheat huller using a hand-mill is relatively inexpensive and easy to maintain and the worn rubber discs are simple to replace. It is ideal for home, small scale farm and village usage. The device can also hull millet.

For details contact: Allen Dong, I-Tech., P.O. Box 795, Davis, California 95617, USA.  
(Invention Intelligence March 1990, 112-113)

## 182 Meat robot under test in the UK

A robot that can drive a powered knife through the rot section of a beef carcass and then follow the trajectory of the bone to separate the meat, has been successfully tested at Bristol University (UK).

The prototype has been developed as part of a research programme to produce an 'intelligent' meat industry robot guided by artificial vision and other sensors. It is the result of a collaborative project between Bristol University's research group and the Institute of Food Research in Bristol. Initially, the robot will concentrate on industrial meat cutting which is highly labour intensive and requires skilled labour.

(Chemical Weekly 35(34), 1990, 97)

## Packaging

## 183 Cooling bag

A Korean firm has developed and commercialized a bag for cooling and carrying beverages, fruits, meat and other food items. The bag is handy both indoors and outdoors.



The bag has an exterior mode of a special polyester and an inner surface consisting of a specially treated two-fold soft vinyl. The bag gives long-lasting cooling effect and is water, heat and scratch resistant.

By putting ice cubes or ice cooler inside the bag, the cooling effect is sustained for 8 to 10 hours. The drain hole inside the bag lets the melting ice out.

For details, contact: Dae Kwang Vinyl Co., 379-71, Hwa Kog-Dong, Kang Seo-Ku, Seoul, Republic of Korea.  
(Asia-Pacific Tech Monitor March-April 1990, 28)

#### 184 Smart packaging

An intriguing chain reaction is taking place in advanced countries in food packaging. What is emerging is a new generation of 'smart' packages. These packages do more than just offer protection. They interact with the product and in some cases, actually respond to changes. For example, if you buy frozen fish in Japan, you may encounter a disposable wrap from Showa Denko called New Pichitto. As the fish thaws, the film absorbs moisture, protecting the flavour and texture of the meat. The film has a thin layer of saccharides sandwiched between two layers of vinyl, which absorbs 3-4% of the water per hour.

The coming of microwave ovens has created new innovations in packaging for microwaveable foods. For example, susceptors are the smart package of choice for microwaveable foods. Susceptors are 0.9 mil. squares of PET film coated with a metallised aluminium surface. They absorb microwave energy reaching temperatures as high as 260 C. The surface becomes so hot, it actually makes the food crisp.

In Belgium, Van Leer Flexibles has developed a polypropylene film for fresh vegetables that allows the produce to respire. The catch is that the rate can be varied with an inexpensive additive between 5 and 8000 cc/min. In USA, Zapata Industries is reported to be closing in on an oxygen absorbing cap for beer. If completed, the cap would improve both the shelf-life and flavour of beers in future.

Another, more exotic application of smart packaging is 'shape memory' alloys. These are materials that change their shape when heated, then return to their original form when cooled. In future, one can imagine a spring on a package that would 'pop' open during cooking to vent steam.

More information on smart packaging can be obtained by referring to the report 'Global Opportunities in Smart Packaging Materials For Consumer Products'. For this report contact Technology Catalysts Inc., Falls Church, Virginia, USA.  
(Chemical Weekly 35(39), 1990, 89)



## 85 Comparative cost of modern packing materials

Materials	Indian Price (Rs./kg)	Duty Burden (%)	International Price (Rs./Kg)	Import Duty (%)
Paperboard	11.34	24	6	180
LDPE	24.70	244	8.9	170
Aluminium Foil	78.80	28	37	328
200 ml Aseptic Pack (Per unit)	0.65	31	0.25	170

(Productivity 30(4), 1990, 477)

## Analysis

## 186 Cation exchanger for food protein analysis

A polymeric cation exchanger, PL-SCX, has been developed for the analysis of biological macromolecules. The material is a rigid macroporous polymer which is chemically resistant, and suitable for the analysis of complex biological matrices after only the minimum amount of sample preparation. Food protein analysis is an important application area in which the requirement for high resolution/high speed and reproducible separations is paramount. The requirement to control and hence check the composition of food products is essential. The high speed analytical PL-SCX column can be used to obtain the protein profiles of aqueous extracts of meat and/or meat products. These profiles are characteristic of a particular type of meat. As the PL-SCX media can easily be regenerated with acid, alkali or organics the only sample preparation required for the aqueous extracts is filtration or centrifugation to remove suspended debris.

For more details write to Polymer Laboratories Ltd, Essex Road, Church Stretton, Shropshire, SY6 6AX, U.K.  
(Chemical Products Finder 8(12), 1990, 103)

## 187 Meter tests sweetness of melons

A device that measures the sugar content of melons non-destructively has been invented by scientists at the USDA Richard B. Russell Research Centre, Athens, GA, USA. The test determines the amount of soluble solids or sugars (sucrose, glucose and fructose) in a melon.



The meter emits a near infrared signal into one end of the melon and then measures the amount of light that penetrates the sides. A quartz halide projection bulb is used to get light in the 800-1,000 nm wave length region. The bulb shines a beam through three interference filters mounted on a paddlewheel. Each filter is tilted to change the angle of incidence of the beam and, thus, the wavelength. About 1 mw of energy is emitted at 900 nm.

Off-the-shelf silicon detectors connected to a computer sense any light that is not absorbed by the melon. The correlation coefficient obtained in experiments between the theoretical sugar content of honeydew melons and spectral data is 0.87.

The melon meter can be applied to any product in which sugar is a constituent of at least 5%.

The scientists are engaged in further increasing the efficiency of the meter and hope to have a melon meter on the market for growers and fruit packers in a couple of years.  
(Invention Intelligence May 1990, 205)

## Commercial Intelligence

### Production (Raw Materials)

#### 188 India ranks third in coconut production

India holds the third position in the world both in production and areawise cultivation of coconuts, according to the Assistant Director-General of the Indian Council of Agricultural Research (ICAR), Dr. Rethinam.

Presiding over a seminar on coconut development at Tenkasi in Nellai-Kattabomman district, he said the area under coconut cultivation had increased to 1.4 million hectares in 1988 against 600,000 hectares in 1949 and the annual production to 77 billion nuts from 35 billion, during the same period.  
(Deccan Herald 8 July 1990, 14)

(Production in '000 tonnes)

State	Rice	Jowar	Bajra	Maize	Ragi	Small Millets	Wheat	Barley
Andhra Pradesh	7,069.4	1,032.2	170.2	484.6	150.6	135.3	4.2	-
Assam	2,715.8	-	-	11.3	-	5.3	105.8	-
Bihar	4,610.5	2.7	5.0	708.8	52.2	42.9	2,776.6	54.5
Gujarat	279.3	125.2	346.1	92.6	13.9	10.4	351.2	6.8
Haryana	1,073.0	15.0	109.0	33.0	-	-	4,861.0	99.0
Himachal Pradesh	76.1	-	-	405.7	1.6	3.6	351.2	28.7
Jammu and Kashmir	420.8	0.1	3.7	298.0	-	9.3	212.0	4.3
Karnataka	1,908.8	1,477.0	285.3	516.8	1,233.2	104.6	133.9	-
Kerala	1,038.9	0.7	-	-	0.7	1.4	-	-
Madhya Pradesh	4,100.4	1,766.7	108.8	863.1	4.4	347.3	4,328.8	130.2
Maharashtra	1,712.8	5,951.9	909.6	120.0	209.2	105.0	633.4	8.5
Manipur	312.8	-	-	10.3	-	-	-	-
Meghalaya	98.7	-	-	20.1	-	3.1	6.7	-
Nagaland	86.0	-	-	9.5	-	-	-	-
Orissa	3,481.4	25.7	6.0	168.9	189.0	55.5	80.9	-
Punjab	5,431.0	0.3	14.0	366.0	-	-	11,066.0	89.0
Rajasthan	79.0	242.7	462.0	298.7	-	1.4	2,909.8	367.9
Sikkim	19.0	-	-	50.4	5.0	-	17.7	1.1
Tamil Nadu	5,604.5	768.8	302.1	31.5	329.1	188.8	0.1	-
Tripura	433.2	-	-	-	-	-	5.1	-
Uttar Pradesh	6,221.1	432.6	557.3	999.2	119.1	128.2	16,462.9	787.3
West Bengal	9,271.7	0.3	0.1	101.6	10.9	6.1	673.9	13.7
Andaman & Nicobar Islands	27.5	-	-	-	-	-	-	-
Arunachal Pradesh	125.1	-	-	35.0	-	20.0	6.9	-
Dadra & Nagar Haveli	18.9	0.6	-	-	3.8	0.5	0.2	-
Delhi	5.2	4.5	1.0	-	-	-	107.2	1.4
Goa	111.1	-	-	-	0.9	-	-	-
Mizoram	49.2	-	-	3.9	-	-	-	-
Pondicherry	51.5	-	1.0	-	1.3	-	-	-
Daman & Diu	1.6	-	0.6	-	-	-	-	-
All-India	56,434.3	11,847.0	3,281.8	5,629.0	2,324.9	1,168.7	45,095.5	1,592.8

(Agricultural Situation in India January 1989, 910-918)



All India final estimate of pulses, 1987-88

(Production in '000 tonnes)

State	Gram	Tur	Black gram	Green gram	Horse gram	Lentil	Peas	Khesari	Moth bean	Others
1	2	3	4	5	6	7	8	9	10	11
Andhra Pradesh	18.5	44.8	297.1	227.3	51.2	-	-	-	-	5.1
Assam	1.6	6.2	-	-	-	-	-	-	-	53.1
Bihar	139.6	85.9	42.9	105.5	30.0	117.6	22.6	265.4	-	11.8
Gujarat	10.9	111.0	13.4	2.9	-	-	-	-	0.7	3.8
Haryana	66.0	32.2	1.2	1.3	-	7.0	4.1	-	-	0.1
Himachal Pradesh	1.0	-	1.6	-	0.5	-	-	-	-	1.5
Jammu & Kashmir	0.5	-	3.7	2.2	0.3	0.2	3.5	-	6.8	1.0
Karnataka	102.7	211.4	31.4	88.1	214.9	-	-	-	-	45.0
Kerala	-	0.2	1.5	1.0	11.7	-	4.2	-	-	0.8
Madhya Pradesh	1,470.7	387.0	147.1	51.8	39.0	146.4	44.8	198.1	-	3.3
Maharashtra	228.5	534.6	209.9	292.4	70.4	3.7	3.4	18.5	32.2	20.4
Meghalaya	0.4	0.8	-	-	-	-	-	-	-	1.5
Nagaland	-	-	-	-	-	-	-	-	-	3.7
Orissa	26.0	85.0	296.0	349.9	198.8	-	-	-	-	83.8
Punjab	29.2	24.9	3.9	27.0	-	6.4	7.3	-	0.4	-
Rajasthan	411.2	1.5	17.5	12.6	-	7.7	9.0	-	6.8	5.6
Sikkim	-	-	6.2	0.5	-	-	-	-	-	10.0
Tamil Nadu	5.0	98.0	120.1	39.9	71.6	-	-	-	-	28.4
Tripura	0.4	0.3	0.8	0.6	-	0.3	0.4	-	-	1.0
Uttar Pradesh	1,068.9	603.9	61.9	48.1	-	300.2	304.3	-	0.3	-
West Bengal	40.5	5.0	55.5	14.3	4.6	63.9	6.0	35.9	-	0.9
Andaman & Nicobar Island	-	-	-	-	-	-	-	-	-	0.3
Dadra & Nagar Haveli	0.1	1.1	1.4	-	-	-	-	-	-	0.3
Delhi	0.1	0.3	-	-	-	-	-	-	-	0.5
Mizoram	-	-	-	-	-	-	-	-	-	1.0
Pondicherry	-	-	1.2	0.7	-	-	-	-	-	-
All India	3,621.8	2,234.1	1,314.3	1,266.1	693.0	653.4	409.6	517.9	47.2	282.9

(Agricultural Situation in India January 1989, 919-926)

## 191 All-India final estimate of oilseeds production, 1987-88

(Production in '000 tonnes)							
State	Groundnut	Sesamum	Rapeseed & Mustard	Nigerseed	Safflower	Sunflower	Soyabean
1	2	3	4	5	6	7	8
Andhra Pradesh	1,708.2	21.3	0.6	5.1	7.5	51.8	-
Assam	-	7.7	167.5	-	-	-	-
Bihar	5.1	5.8	61.0	10.9	0.2	0.1	-
Gujarat	140.0	3.9	184.4	-	-	-	3.1
Haryana	3.2	0.8	329.0	-	-	-	-
Himachal Pradesh	-	1.1	1.1	-	-	-	0.1
Jammu & Kashmir	1.4	3.4	34.1	-	-	-	-
Karnataka	924.5	69.9	0.5	12.2	113.8	409.3	5.0
Kerala	4.7	3.2	-	-	-	-	-
Madhya Pradesh	229.8	41.9	253.7	44.1	0.4	-	741.5
Maharashtra	617.8	64.7	1.0	26.2	327.8	129.0	24.6
Manipur	-	0.2(E)	2.7(E)	-	-	-	-
Meghalaya	-	0.7	3.9	-	-	-	0.9
Nagaland	0.7	0.7	4.6	-	-	-	0.4
Orissa	542.5	129.8	64.8	74.4	1.6	0.2	-
Punjab	22.0	4.1	209.0(T)	-	-	-	61.3
Rajasthan	112.5	5.8	1,031.7	-	-	1.5	5.9
Sikkim	-	-	6.2	-	-	-	-
Tamil Nadu	1,259.9	41.9	0.2	-	-	14.8	-
Tripura	1.4	1.2	3.4	-	-	-	-
Uttar Pradesh	71.0	12.7	662.6	-	-	1.9	135.5
West Bengal	24.4	139.1	334.0	2.0	-	1.1	0.4
Arunachal Pradesh	-	0.4	13.8	-	-	-	1.3
Delhi	-	-	0.4	-	-	-	-
Mizoram	-	1.5	-	-	-	-	-
Pondicherry	5.1	0.2	-	-	-	-	-
Dadra & Nagar Haveli	-	-	-	0.1	-	-	-
All-India	5,673.3	562.0	3,370.2	175.0	451.3	609.7	980.0

(E) Estimated

(T) Tentative Estimate

(Agricultural Situation in India February 1989, 1002-1009)



## 192 All-India final estimate of spices, 1988-89

State	Production in '000 tonnes				
	Chillies	Ginger	Pepper	Turmeric	Coriander
Andhra Pradesh	272.4	14.14	-	156.6	18.4
Arunachal Pradesh	1.0	3.82	-	0.7	-
Assam	7.7	-	-	5.4	-
Bihar	3.7	0.76	-	4.3	4.2
Gujarat	15.5	0.34(E)	-	-	-
Haryana	5.7	0.06	-	-	0.8
Himachal Pradesh	0.1	0.53	-	-	-
Jammu & Kashmir	0.5	-	-	-	-
Karnataka	37.6	2.98	0.68	20.1	2.5
Kerala	0.9	45.85	42.51	6.2	-
Madhya Pradesh	9.9	3.58	-	0.8	22.8
Maharashtra	64.2	0.97	-	7.0	-
Manipur	3.0	0.60	-	-	-
Meghalaya	1.1	29.00	-	1.8	-
Mizoram	2.0	8.44	-	-	-
Nagaland	0.3	0.92	-	-	-
Orissa	58.1	13.46	-	33.1	4.9
Punjab	5.1	-	-	-	-
Rajasthan	37.9	0.10	-	0.4	101.8
Sikkim	-	14.00	-	-	-
Tamil Nadu	32.6	0.64	0.22	87.9	14.4
Tripura	0.6	1.19	-	2.0	-
Uttar Pradesh	16.4	3.54	-	0.8	3.4
West Bengal	32.7	8.65	-	13.2	-
Pondicherry	-	-	0.01	-	-
All-India	609.0	153.57	43.42	339.8	173.2

(E) Estimated  
(Agricultural Situation in India February 1990, 987-990)

## 193 All India final estimate of potato and onion, 1988-89

(Production in '000 tonnes)

State	Potato	Onion
Andhra Pradesh	3.6	125.6
Arunachal Pradesh	20.9	-
Assam	345.9	11.2
Bihar	1,472.0	120.0
Gujarat	314.5	527.9
Haryana	142.0	39.5
Himachal Pradesh	110.0	1.6
Jammu and Kashmir	2.8	Neg.
Karnataka	217.3	274.6
Kerala	-	Neg.
Madhya Pradesh	352.5	209.0
Maharashtra	50.9	780.9
Manipur	11.4	-
Meghalaya	71.1	-
Mizoram	2.2	-
Nagaland	5.0	0.7
Orissa	78.7	309.5
Punjab	513.8	25.3
Rajasthan	28.2	83.7
Sikkim	31.6	-
Tamil Nadu	104.6	220.3
Tripura	54.4	0.2
Uttar Pradesh	6,612.8	505.0
West Bengal	4,345.9	-
Delhi	0.4	1.3
Pondicherry	-	0.1
All-India	14,892.5	3,236.4

(Agricultural Situation in India January 1990, 880-881)

## 194 Area, production and export of pepper in India

Year	Area ( '000 Ha)	Production ( '000 MT)	Export Quantity ( '000 MT)	Export Value (Rs. lakhs)	U. Value. (Rs./kg.)
1986-87	132.81	31.34	37.08	20033.00	54.02
1987-88	158.49	49.23	41.01	24057.78	58.66
1988-89	NA	NA	41.06	18777.96	45.73

N.A. - Not available  
(The Economic Times 15 June 1990, I)



195 World production of pepper and India's share

Year	World production ( '000 MT)	Share of India ( '000 MT)	Percentage share
1987	134.9	45.0	33.4
1988	174.0	60.0	34.5
1989*	163.0	40.0	25.5

\*estimates  
(The Economic Times 15 June 1990, II)

196 Area, production and export of coriander in India

Year	Area 000 Ha	Production ( '000 MT)	Export		
			Quantity ( '000 MT)	Value ( Rs. lakhs)	U. Value ( Rs. /Kgs.)
1986-87	395.20	182.50	1.18	140.13	11.91
1987-88	485.00	243.00	0.89	139.47	15.64
1988-89	NA	NA	8.52	566.83	6.65

(The Economic Times 15 June 1990, II)

197 Area, production and export of garlic in India

Year	Area	Production	Export		
			Quantity ( '000 MT)	Value ( Rs. lakhs)	U. Value ( Rs. /Kgs.)
1986-87	59.60	208.20	0.57	51.57	8.98
1987-88	79.40	286.70	0.24	19.44	8.05
1988-89	NA	NA	4.17	240.06	5.76

(The Economic Times 15 June 1990, II)

198 Area, production and export of ginger (dry) in India

Year	Area '000 Ha	Production ( '000 MT)	Export		
			Quantity ( '000 MT)	Value ( Rs. lakhs)	U. Value ( Rs. /Kg.)
1986-87	52.65	136.01	4.84	571.16	11.79
1987-88	53.69	135.46	2.63	488.99	18.60
1988-89	NA	NA	5.20	921.81	17.73

(The Economic Times 15 June 1990, II)

## 99 World production of cardamom (small)

Year	(Tonnes)				
	World produc- tion	Indian produc- tion	Gautemala produc- tion	Other produ- cers	Indian produc- tion as % of world production
1986-87	12800	3800	8000	1000	29.7
1987-88	13700	3200	9500	1000	23.4
1988-89	13000	4250	8000	750	32.7

(The Economic Times 15 June 1990, III)

## 200 Area, production and export of cardamom (small) in India

Year	Area '000 Ha	Production ( '000 MT)	Export		
			Quantity ( '000 MT)	Value (Rs. lakhs)	U. Value (Rs. /Kg.)
1986-87	100.00	3.80	1.45	1849.52	128.00
1987-88	105.00	3.20	0.27	340.00	126.00
1988-89	105.00	4.25	0.79	1028.45	130.73

(The Economic Times 15 June 1990, I)

## 201 Area, production and export of turmeric in India

	Area '000 Ha	Production ( '000 MT)	Export		
			Quantity ( '000 MT)	Value (Rs. lakhs)	U. Value (Rs. /Kg.)
1986-87	109.90	319.90	19.53	1918.30	9.82
1987-88	107.70	294.90	8.75	922.72	10.55
1988-89	NA	NA	16.52	1736.55	10.51

(The Economic Times 15 June 1990, II)



# 202 Area, production and export of chillies in India

Year	Area '000 Ha	Production ( '000 MT)	Export		
			Quantity ( '000 MT)	Value (Rs. lakhs)	U. Value (Rs. /Kg.)
1986-87	834.60	629.20	4.32	495.80	11.45
1987-88	738.00	574.60	6.12	833.45	13.61
1988-89	NA	NA	5.42	1205.54	22.23

(The Economic Times 15 June 1990, II)

# 203 Revised coffee estimate, 1989-1990

(in metric tonnes)

State	Arabica	Robusta	Total
Karnataka	55,000	41,500	96,500
Kerala	1,500	28,300	29,800
Tamilnadu	14,500	4,200	18,700
<b>TOTAL</b>	<b>71,000</b>	<b>74,000</b>	<b>145,000</b>

(Indian Coffee 54(4), 1990, 26)

# 204 Coffee output to rise by 73 p.c. in 1990-91

Coffee production in the country during the current financial year 1990-91 is expected to reach a target of Rs.2,25,000 tonnes, a 73 per cent increase over the figures of 1989-90. During the last financial year, 1989-90, coffee production totalled 130,000 tonnes which was 39 per cent less than the previous year's production.

India exported 1,22,496 tonnes of coffee valued at Rs.3661.1 million during 1989-90 (April to February) compared to 98,256 tonnes valued at Rs.3377.2 million in the previous year.

The US was the largest buyer of Indian coffee, importing 6061 tonnes valued at 933.3 million during 1989. It was followed by West Germany, Italy, Japan and Yugoslavia.

Kuwait headed the list of coffee exporters in the free currency areas, buying 1574 tonnes valued at Rs.59.2 million during April-October 1989. The Soviet Union topped among the Rupee payment countries importing 27950 tonnes of coffee worth Rs.992.1 million during 1989-90. Other important importers were Czechoslovakia, East Germany and Romania.

India, which is self-sufficient in coffee, accounts for 2.4 per cent of the world's total production and about two per cent of the global exports.

Domestic coffee consumption during 1990 will be around 65000 tonnes which is 2.6 per cent more than the previous year's figure of 63328 tonnes. In 1988 the consumption was 55560 tonnes.

Under the Coffee Act, all coffee produced is compulsorily pooled with the Coffee Board for sale. Coffee is sold in the domestic market mainly through auction and its reserve prices based on the minimum release prices. Coffee meant for exports is sold in separate export auctions.

This unique mechanism of coffee pooling and separate auction systems for domestic and export sales has helped in providing fair returns to growers and also restraining fluctuations in coffee prices.

(Economic and Commercial News 20(18), 1990, 12-13)

## 205 Cashew output

Karnataka produced 22,940 tonnes of cashewnut during 1987-88 and 23,680 tonnes in 1988-89. The State exported 34,023 tonnes in 1988-89 and 45,133 tonnes during 1989-90.  
(Deccan Herald 11 May 1990, 5)

## 206 Tea production

Tea production in the country this year is expected to reach the 740-million kg mark against 700 million kg last year.

Official sources said on Wednesday that production was initially lower compared with last year with more than average rainfall. The weather has improved now.

Guwahati which had earned the reputation of being the world's biggest CTC auction centre last year sold 150 million kg. The target this year was 180 million kg sources added.  
(Financial Express 6 July 1990, 10)



Production (Industrial)

## 207 Process food industry demand by 1995

(lakh tonnes)

Sector	Present production	Projected demand
ORGANISED SECTOR		
Bakery products*	12.590	34.00
Confectionery	0.260	0.37
Fruit and vegetable products	2.170	3.40
Chocolate	0.008	0.29
Dairy products processed :		
-- Baby food	0.490	0.95
-- Condensed milk	0.007	0.20
-- Milk powders	0.500	1.27
-- Ghee	0.200	0.63
-- Ice cream (lakh litres)	0.009	0.57
-- Malted milk food	0.280	0.46
Weaning food	0.009	0.25
High protein foods	0.009	0.17
Soft drinks (million bottles)	1.860	3.239
Beer (lakh Kl.)	1.990	4.27
Starch and derivatives	1.420	3.16
Instant coffee	0.006	0.20
Meat products	0.180	1.51
Vanaspati	8.700	17.22
Marine products	1.000	1.56

\* Also includes production in unorganised sector  
(Indian Miller 20(3), 1989, 19)

## Export

## 208 Trend in export of spices from India during 1984-85 to 1988-89

(Qty. in tonnes; value in Rs.lakhs)

Items	1987-88		1988-89	
	Qty.	Value	Qty.	Value
Pepper	41011	24058	41065	18778
Cardamom (small)	270	340	787	1028
Cardamom (large)	155	70	481	186
Chillies	6122	833	5424	1206
Ginger	2628	489	5198	922
Turmeric	8747	923	16518	1737
Curry powder	2559	438	2735	504
Seed spices	7709	1056	17535	1837
Other spices	650	104	4257	251
Spice oils	46	272	39	268
Spice oleoresins	382	1225	448	1562
Total	70279	29808	94437	28279

(The Economic Times 15 June 1990, I)

## 209 Countrywise export of black pepper

(Qty. in tonnes; value in Rs.crores)

Country	1987-88		1988-89	
	Qty.	Value	Qty.	Value
USSR	17570	106.9	12539	60.9
USA	7228	42.5	4777	21.9
Yugoslavia	1917	12.2	1803	8.4
FRG	1750	9.6	1468	6.5
Italy	1018	6.3	1771	8.3
Czechoslovakia	405	2.6	1077	4.9
France	1789	9.6	1487	6.7
Others	7491	46.3	14246	65.5
Total	39583	236.0	89168	183.1

(The Economic Times 15 June 1990, II)



## 210 Categorywise export of pepper

Item	1987-88		1988-89	
	Quantity		Quantity	
	( '000 tonnes)	Value (Rs.crores)	( '000 tonnes)	Value (Rs.crores)
Pepper whole	39.6	236.0	39.2	183.1
Dehydrated green pepper	0.1	1.7	0.1	1.2
Pepper powder	0.1	0.5	0.06	0.2
Long pepper	0.04	0.1	-	-
White pepper	0.002	0.02	0.007	0.06
Pepper oil	0.01	0.7	0.02	1.2
Pepper oleoresin	0.2	8.9	0.2	8.2

(The Economic Times 15 June 1990, II)

## 211 Countrywise export of turmeric from India

(Qty: MT; Value Rs. lakhs)

Country	1987-88		1988-89	
	Qty.	Value	Qty.	Value
Japan	1497	153	1637	151
USA	1265	184	1663	234
UK	857	92	1047	120
Singapore	436	44	512	58
Saudi Arabia	399	37	334	34
Netherlands	243	28	147	17
Kuwait	243	25	196	17
Iran	262	18	1045	106
Sri Lanka	296	17	191	15
Canada	136	20	111	15
UAR	101	9	298	29
UAE	1217	102	6746	655
Others	1795	194	2591	285
Total	8747	923	16518	1737

(The Economic Times 15 June 1990, III)

## 12 Country-wise export of dry ginger from India

(Tonnes)

Country	1987-88	1988-89
Saudi Arabia	1314	2055
USA	197	405
YAR	374	646
Morocco	-	310
U.K.	98	141
U.A.E.	35	158
Netherlands	82	146
Others	528	1307
Total	2628	5198

(The Economic Times 15 June 1990, III)

## 213 Export of chillies from India

Year	Quantity ( '000 tonnes)	Value (Rs.lakhs)	Unit Value (Rs./Kg)
1986-87	4.3	495.8	11.5
1987-88	6.1	833.5	13.6
1988-89	5.4	1205.5	22.2

(The Economic Times 15 June 1990, III)

## 214 Onion export

The Government has permitted export of consignments of onions upto 20 kg under Open General Licence (OGL-3) by air as a part of assorted vegetables irrespective of the size.

(The Economic Times 12 June 1990, 1)

## 215 Minimum export price for pepper

International Pepper Community at its recent meeting held at Yogyakarta in Indonesia, endorsed the decision of the pepper exporters, not to sell Black Pepper below U.S. \$ 1.00/lb. Thus the meeting decided to maintain the 'status quo'.

The meeting also decided to exchange planting materials between the member countries for the purpose of experimentation. It has also been decided to arrange the visit of extension workers and progressive pepper farmers from Indian and Indonesia to Malaysia during the third quarter of 1990 under an exchange programme. The IPC budget of U.S. \$ 189,176.00 for 1990 was approved. India being the largest



producer and exporter of pepper will have the biggest share of U.S. \$ 55,883.  
(Indian Cocoa, Arecanut & Spices Journal 13(2), 1989, 76)

## 216 India tops cashew exporter

India has re-emerged as the world's largest supplier of cashew kernels, exporting 43,880 tonnes of the nuts, thereby meeting nearly 50 per cent of the world demand of around 90,000 tonnes in 1989, reports PTI.

World consumption of cashew registered a seven per cent increase over the 1988 figures -- the result of low prices coupled with better supply position. India's cashew kernel exports registered a 37 per cent growth in 1989 over the 1988 level of 32,400 tonnes.

India had conceded the top position in the cashew export field to Brazil in 1988.

As in 1988, the Netherlands was the largest buyer of Indian cashew in 1989 - it bought 14,258 tonnes as against 18,481 tonnes in 1988. The US bought 5,400 tonnes.  
(The Economic Times 31 May 1990, 12)

## 217 Record exports of sesame seed

Sesame seed exports are set to record a new high this season, thanks to a favourable international situation. In the first seven months of the current financial year 1989-90, shipments amounted to 24,000 tonnes. The value of foreign exchange earned is about Rs.30 crores.

The corresponding period in the previous year 1988-89 did not witness any shipment. During the last financial year, total exports of sesame seed in Bombay was 18,000 tonnes valued at Rs.20 crores. In fact, shipments, actually took place during the five months between November 88 and March 1989.

However, in the current year the export of this premium oilseed has been taking place regularly every month. The pace with which export deals are struck and shipments effected indicates that the aggregate export during 1989-90 may well exceed 60,000 tonnes and earn foreign exchange worth over Rs.70 crores.

Major importers and users of sesame seed are Japan in the Far East, the Persian Gulf countries (Saudi Arabia, Jordan, Turkey, South Yemen), the United States, Western Europe including the U.K., West Germany, Italy and Greece and the USSR.

Indian exports are well diversified to cover almost all the major destinations. Japan happens to be the largest buyer of Indian sesame and trading houses there have evinced interest to continue import from India regularly. Large quantities have also been sold to other destinations, including the US and West Europe.



In India, the principal states producing export quality sesame seed (clear colour, high oil content and low acid value) are Gujarat and Maharashtra, Rajasthan and Madhya Pradesh have also since recently started contributing to the export pool.  
(The Oils and Oilseeds Journal 42(4-6), 1989, 27)

## 18 Niger seeds export under OGL planned

The government has decided to permit the export of niger seeds under Open General Licence (OGL-4) through the National Agricultural Co-operative Marketing Federation (NAFED) and the Tribal Cooperative Marketing and Development Federation (TRIFED) both located in New Delhi.

The exporters are required to submit their applications to any of the two canalising agencies. Moreover, they will have to furnish declarations stating that they have not submitted their export applications to another canalising agency. None of the canalising agencies will consider the applications, if the exporters do not attach the required declarations, according to a public notice issued by the Chief Controller of Imports and Exports on December.

In terms of this notification, the canalising agencies will have to furnish monthly statements giving the details of exports allowed, names of exporters, fob value and the destinations to the Commerce Ministry for monitoring.

"This will further be subject to the condition that on the materials originally used in the manufacture of resultant product, against which replenished exempt materials is sought to be disposed of as the case may be, has not availed of the relief under the MODVAT scheme, or under rule 191-B of the Central Excise Rules; and will not claim the same subsequently. A certificate to this effect shall be produced by the licensee from the concerned central excise authorities".

The notification made it clear that for the purpose of eligibility for duty drawback, however, the quantity and value of duty paid materials as declared by the applicant to have been used in the manufacture of the resultant product, will be restricted to the quantity and value as indicated by him, in his application for the licence, and endorsed as such on the Duty Exemption Entitlement Certificate (DEEC).

(The Oils and Oilseeds Journal 42(4-6), 1989, 26-27)

## 219 Food exports rise

A substantial increase in the export of marine, fruit and vegetable products as also items in the consumer industry and milk products was the highlight of 1989-90, reports PTI.



The 1989-90 annual report of the food processing industry ministry also focuses on the progress made in the fruit and vegetable sector.

The total installed capacity of fruit and vegetable processing industries increased from 5.99 lakh tonnes in December 1988 to about 7.08 lakh tonnes at the end of December 1989, the total number of licensed units increased from 3,367 as on December 31, 1988 to 3,629 on December 31, 1989.

Exports of fruit and vegetable products have increased from 49,389 tonnes valued at Rs.49.89 crores during January to December 1988 to 63,967 tonnes valued at Rs. 79.48 crores during January to December 1989.

Exports of marine products by December 1989 were 67,513 tonnes valued at Rs.426.78 crores despite a slump in major international markets.

The report points out that the production of malted milk powder including infant milk food has increased from 1,40,000 tonnes in the year 1988 to 1,65,000 tonnes during the year under report.

Similarly, production of malted milk increased from about 32,000 tonnes and 6,100 tonnes to 35,000 tonnes and 7,900 tonnes respectively.

According to the report the production of various items in the consumer industry sector has increased substantially during the year. The production of ready-to-eat extruded foods has increased from 12,612 tonnes in the year 1987-88 to 14,700 tonnes in the year under report and that of cocoa products increased from a mere 8,720 tonnes in 1987-88 to over 40,000 tonnes during the current year.

Production of high protein food increased from 7,750 tonnes in 1987-88 to 8,900 tonnes in 1989-90 and that of soft drinks increased from 1,876 million bottles in 1987-88 to about 2,070 million bottles in 1989-90.

Referring to the progress in the poultry sector, the report reveals that the modern poultry processing facilities which were not sufficient to process the large-scale production of broilers are being augmented particularly in the private sector.

Some poultry products are coming up to set up modern poultry processing plants. The report indicates that the poultry industry has made impressive progress and has grown into an organised, high productive agro-based industry contributing an estimated Rs.1,300 crores per annum to GNP and employing capital of around Rs.1,000 crores. The industry is producing over 20,000 million eggs and 120 million broilers per annum.

Under the scheme of modernisation of rice mills, the number of modernised rice mills has gone up from about 24,500 during 1988-89 to 26,750 in 1989-90.



Steps are being taken to prepare feasibility reports in sectors such as meat and meat products, fisheries, fruit and vegetable in pursuance of the proposal of the World Bank to fund certain agro-industries projects.

(The Economic Times 15 May 1990, 3)

## 220 Processed food exports

Foreign exchange worth Rs.7798.5 million was earned through the exports of products of the processed food industries during 1988-89. Of this earning, processed food accounted for Rs.1820 million while the rest (Rs.7798.5 million) by way of export of sea food.

The total exports in the year 1987-88 was worth Rs.6762.2 million consisting of processed foods worth Rs.1450.4 million and sea food worth Rs.5312 million. The foreign exchange earnings during 1987-88 from the processed food industries amounted to Rs.5968.4 million.

Disclosing this in the Lok Sabha recently, the Minister of Food Processing Industries, Mr.Sharad Yadav, said that the Government was encouraging exports from the processed food sector through measures like cash compensatory support, duty draw back, setting up of 100 per cent export-oriented units. A number of schemes for the development of marine product industry which is highly export-oriented, have also been formulated, it was added.

(Economic and Commercial News 20(16), 1990, 9)

## 221 Quantity of food products exported from India (Tonnes)

Products	1985-86	1986-87*	1987-88*
Fresh Fruits & Vegetables	223495	320902	196507
Canned vegetables	1370	971	916
Dehydrated vegetables	2409	1128	876
Pickles and chutneys	6352	5700	6360
Preserved fruits and vegetables	54770	46933	38120
Meat and meat products	37659	46818	59500
Marine products	83651	85843	97179
Confectionery and sweetmeats	545	70	NA
Biscuits	1157	821	1205
Guar gum	36084	28337	43947
Malted milkfood	306	892	821
Starch & derivatives	21	2683	1085
Papads	469	3343	3129
Other processed foods	2114	NA	NA
Cocoa products	249	69	151

\*Provisional NA: Not available  
(Productivity 30(4), 1990, 475)



## 222 Export of processed food products-major destinations with percentage share

Items	Major destination by % share (1985-86)
1. Fruit Juice	USSR (71%), Y.A.R. (13%)
2. Canned and Bottled Fruits	USSR (34%), Kuwait (23%), Saudia (78%), Y.A.R. (7%)
3. Dehydrated vegetables	F.R. Germany (26%), U.K. (10%), U.S.A. (9%), France (7.7%)
4. Pickles and Chutneys	U.K. (20%), U.A.E. (15%), Saudia (11%), U.S.A. (10%)
5. Frozen Meat	Malaysia (50%), U.A.E. (22%), Oman (10%), Kuwait (7%), Y.A.R. (6%)
6. Fresh Meat	U.A.E. (57%), Saudia (19%), Oman (18%), Bahrain (5%)
7. Canned Meat	Egypt (54%), Oman (14%)
8. Poultry Products	U.A.E. (39%), Maldives (18%), Nepal (11%)
9. Animal Casings	Spain (34%), Japan (24%), Holland (20%)
10. Confectionary and Sweetmeats	U.S.A. (55%), U.K. (24%), Nepal (18%)
11. Biscuits	U.A.E. (38%), Oman (16%), Maldives (11%)
12. Guar Gum	U.S.A. (48%), U.K. (7%), FRG (8%), Japan (7%), Netherlands (5%), France (5%), Spain (5%)
13. Guar Meal	Germany (30%), U.S.A. (23%), France (16%)
14. Wheat Bran	Bangladesh (34%), Nepal (33%), Sri Lanka (8%), Saudia (7%)
15. Malted Milkfoods	Sri Lanka (50%), Bangladesh (30%), Nepal (15%)
16. Starch and its derivatives	Bangladesh (50%), Sri Lanka (25%), USA (25%)
17. Papads	U.K. (47%), USA (8%), UAE (8%), Saudia (7%), Singapore (7%)
18. Cocoa Products	Germany (37%), Netherlands (36%)
19. Other Processed Foods	Nepal (19%), U.K. (15%), UAE (12%), Canada (10%)

(Productivity 30(4), 1990, 475)

## 223 MFP for buffalo meat raised

The Government has increased the minimum export price (MEP) of buffalo meat from Rs. 11.50 per kg f.o.b. to Rs. 13.50 per kg f.o.b. and for sheep/goat meat from Rs. 26 to Rs. 35 per kg f.o.b.

A public notice dated June 25 was issued here on Friday. Suitable amendments have been made in the export trade control order. (Financial Express 8 July 1990, 3)

## 224 Centre examining prospects of froglegs export

The Centre is examining the question of allowing export of froglegs on a limited scale, according to Marine Products Exports Development (MPEDA) sources here, reports PTI.



India, which had been one of the largest producers and exporters of froglegs since the last several years, banned the export in 1987 following stiff protests from environmentalists who said frogs played a vital role in the control of insects associated with agriculture.

Despite being the biggest exporter of froglegs in the early eighties, no efforts have been made so far to make a realistic estimate of the country's frog resources. Hence there is no scientific basis for the alleged depletion of the frog population and consequent ecological imbalance, according to seafood sources.

Three species of frogs were used for exporting froglegs - *Rana tigrina*, *Rana hexadactyla* and *Rana crassa*. Of these *Rana tigrina* alone contributed about 75 per cent of the export.

Unlike other marine products, the total world trade in froglegs was limited to about 10,000 tonnes per annum and India had a share of about 4000 tonnes during the peak period.

According to reports, illegal exports of froglegs to Bangladesh were going on consequent to the ban in India. The Border Security Force and other security agencies were reported to have been alerted.

Of late, the modus operandi was to export froglegs under the name of frozen fish. The consignments were sent by rail to Calcutta and from there they were transported by road to Bangladesh. Two months ago inspectors of the directorate of wild life preservation (eastern region) found about 1,500 kg of froglegs worth Rs. 1.2 lakh in a consignment of frozen fish.  
(The Economic Times 10 June 1990, 3)

## 225 New norms for rice, safflower seed export

The Government has announced special procedures for the export of safflower seed and non-basmati rice.

Exporters of safflower seed are required to register their contracts backed by 100 per cent irrevocable letters of credit with the Indian Oil and Produce Exporters Association (IOPEA), Bombay. Exports are permitted within a limit ceiling of which not more than 10 per cent will be allocated to an individual exporter. Allocation of ceiling will begin after May 23.

IOPEA will issue ceiling slips on first-come-first-served basis on fulfilment of the said conditions indicating full particulars such as exporter's name, number and date of the order or contract, letter of credit, quantity permitted, freight on board value and the destination.

The Port Licensing Authority concerned will issue guidelines within 48 hours of getting the ceiling advice from the IOPEA.

The new procedures also have a provision of penalising an exporter who fails to export the full quantity allocated. Such a person will be debarred from exporting the same commodity again. Further,



the procedures require that the exporter give the details to IOPEA and the port authority concerned within 15 days of the shipment from the expiry of the export licence failing which it will be assumed that the exports are nil and action would be taken accordingly.

IOPEA has to send a monthly statement to the Government indicating full details and immediately report if the ceiling is exhausted.

The same procedure has also been laid down for the export of non-basmati rice.

(Economic and Commercial News 20(21), 1990, 6-7)

## 226 Alcohol export front brightens

India is emerging as a major exporter of industrial alcohol, which has established itself as a potent source of foreign exchange earnings. About 615 lakh litres of alcohol were exported to overseas markets during 1989, which helped to rake in a foreign exchange earning of Rs. 240 million. Japan and Korea have shown interest in lifting industrial alcohol from India. A Japanese delegation was in India recently to discuss details about the quality and supply position of alcohol with the Indian manufacturers. India has already developed a capacity for the production of about 1,600 million litres of alcohol per annum. With the expansion of sugar production capacity in the near future, this is bound to increase rapidly.

In the domestic area, the utilisation of industrial alcohol has risen by 19 per cent during the alcohol year 1988-89. The exportable surplus for the current year is expected to be around 2,062 lakh litres. Out of this, if efforts are made to export about 2,000 litres of alcohol, it will bring in a foreign exchange earning of Rs. 1,000 million, say industry sources.

(Chemical Products finder 8(12), 1990, 127)

## 227 Coffee exports go up

Coffee exports have gone up to 53.9 million kgs during April-September, 1989 as compared to 41.7 million kgs during the corresponding period in 1988.

The exports of coffee amounted to Rs. 2021.1 million during April-September, 1989 as compared to Rs. 1408.8 million during the corresponding period in 1988.

The export of coffee during 1988-89 was valued at Rs. 2797.1 million as compared to Rs. 2632.2 million during 1987-88, an increase of 6.3 per cent.

To encourage exports, coffee has been exempted from the purview of export duty. The Minimum Release Price (MRP) had been revised in October 1988. To boost export of value-added items like instant coffee, the Government is offering Cash Compensatory Support (CCS) and Import Replenishment on exports of instant coffee. During the current year, the rate of CCS has been enhanced from 15 per cent to



20 per cent in the case of exports of instant coffee in consumer packs of 100 gms and from 10 to 18 per cent in the case of exports of instant coffee in bulk.

(Economic and Commercial News 20(16), 1990, 10)

## 228 Panel to monitor exporters' problems set up

The Union Commerce Ministry has issued a notification constituting an inter-ministerial committee to deal with the problems faced by exporters with regard to pre-shipment as well as post-shipment stages.

The Committee, which is called 'Export Facilitation Committee', and is headed by the Chief Controller of Imports and Exports (CCI & E), will also look into problems of generic nature arising out of the exporters' direct interaction with the various agencies in the Commerce or other ministries and departments.

The Committee, which will meet once a month, would propose solutions as also monitor and improve the speed of processing in order to resolve problems faced by exporters in a pragmatic and a positive fashion, according to the notification.

The committee will deliberate on the pre-shipment problems relating to availability of credit, inputs (both capital goods and raw-materials), collaborations, setting up of 100 per cent export oriented units (EOUs), promotion of markets, fixation of draw-back and its rates, besides transport infrastructure.

Similarly, it will also examine post-shipment problems like disbursement of incentives such as cash compensatory support (CCS), REP and additional licenses, duty-draw back as well as international price reimbursement scheme (IPRS), customs clearance and trade disputes.

The members of the Committee would include representatives of trade and industry besides government officials. The members include: the CCI & E (Chairman); member (Customs); three joint secretaries in the Commerce Ministry dealing with export services, export production and institutions); joint secretary (monitoring unit of the cabinet committee in the industry ministry); joint secretary (transport); joint secretary (banking); joint secretary (chemicals); deputy director-general in the Director-General Technical Development (DGTD); director (duty-drawback); a representative of the Industrial Development Bank of India (IDBI) and representatives of the EXIM Bank, the Export Credit and Guarantee Corporation; a representative each of the Federation of Indian Export Organization (FIEO), Associated Chambers of Commerce and Industry (ASSOCHAM), Federation of Indian Chambers of Commerce and Industry (FICCI) and the Confederation of Engineering Industry (CEI).

The committee has been authorised to invite other functionaries such as the collectors of customs, representatives of the export promotion councils and commodity boards as well as institutions like the Indian Institute of Foreign Trade (IIFT).



The exports commissioner is the member-secretary. He will provide secretarial assistance.  
(Economic and Commercial News 20(16), 1990, 8-9)

## Import

### 229 Import replenishment rate on marine products raised

The government today increased the import replenishment rate to 15 per cent from five per cent, with immediate effect, on exports of marine products.

Orders to this effect were passed by the commerce minister Mr. Arun Nehru.

Exports of marine products were worth about Rs. 622.5 crores in 1989-90 compared with Rs. 597.85 crores in the previous year.  
(Economic Times 9th June 1990, 1)

### 230 Government urged to scrap import duty on cloves, cassia

A strong-case has been made out by the All-India Spices Importers and Distributors Association for the abolition of import duties on cloves and cassia.

In a representation to the commerce minister, Mr. Arun Nehru, the association has drawn his attention to the serious setback which has been caused to trade by the large-scale smuggling of these items from Nepal and Sri Lanka.

In the case of cassia, the cost price including import duty and other levies, works out to Rs. 147.50 per kg, while the market price ranges from Rs. 120 to Rs. 125 a kg.

The cost price of cloves, on the other hand, including import duty and other levies, is stated to be Rs. 172 compared with the market price of Rs. 130 to Rs. 135 a kg.

On top of this imbalance in cost and market prices, there is an export obligation equivalent to 100 per cent of the import value. This obligation, obviously, will put an additional burden on the importers and make the imports totally unprofitable, Mr. Ratanlal, president of the Association, has pointed out in the representation made to Mr. Nehru on Friday.

The government is losing considerable amount of revenue as a result of the smuggling of the two items, the association has said.

The association hopes that as the minister responsible for the growth of trade and commerce, Mr. Nehru would take up the issue with the finance minister, Mr. Madhu Dandavate, and get the import duties abolished.

(The Economic Times 8 May 1990, 3)

## Trade Information

### 231 Technology mission for pulses proposed

The Union government has proposed to extend the scope of the technology missions to cover the production of pulses.

As a first step, an integrated policy framework has been prepared for encouraging the production of pulses during the Eighth Five Year Plan. The policy emphasises on providing corrective incentives through the price mechanism and technology inputs. It will try and coordinate the interests of farmers, consumers and the industry.

The need for a mission was felt because pulses recorded one of the slowest rates of growth within the agricultural sector. The index number of agricultural production shows that the index for pulses went up to a mere 123.9 points in 1988-89 (base: 1969-70) from 104.4 points in 1970-71. In comparison, the index for rice went up from 107.4 to 181.2 points while wheat grew faster from 132.1 to 299.1 points. In this period, the index for all commodities went up from 111.5 points to 182.7 points.

Then again, the area under pulses remained stagnant in the last two decades at about 23 million hectares while the yield went up marginally by about 15 per cent as against an average agricultural yield growth of about 40 per cent.

In the prime pulse growing areas of Haryana and Punjab, the cultivation of pulses was replaced by wheat because it was found to be more lucrative.

A major impeding factor has been the differential between the price received by the grower and the retail price. The farmer is reported to receive only Rs. 4.50 per kg. of pulses while the consumer price is about Rs. 12.

(The Economic Times 27 May 1990, 1)



## 232 Some economic indicators in the food processing sector

Years	Gross value Added at 1980-81 Prices (Rs. Lakhs)	Gross Fixed Capital at 1980-81 Prices (Rs. Lakhs)	Total Emolu- ments at 1980-81 Prices (Rs. Lakhs)	Total Employment (Nos.)
1981-82	35501	97085	14696	453630
1982-83	35244	104168	16843	457880
1983-84	49723	131844	16463	425224
1984-85	52517	131844	16938	465277
1985-86	55853	134886	20032	443664

(Productivity 30(4), 1990, 468)

## 233 Support price for pineapple

The Tripura Government has announced support price of pineapple at 70 paise per kilogram for the current season. The State Agriculture Minister Mr. Nagendra Jamatia, told newsmen that this was the first time the State Government had announced the support price to prevent distress sale of the fruit, which grows in plenty in the State. NAFED and the State-level apex co-operative institution would make the purchase from different pockets for marketing in other States.

(Financial Express 23 June 1990, 9)

## 234 Development plan for oilseeds

The technology mission on oilseeds has proposed development plans, costing Rs.390 crore during the Eighth Plan. The plan includes an estimated additional annual recovery of 2.5 lakh tonne of edible oil and additional annual production of one million tonne of extraction free from toxic substance. The plan aims at making 40,000 tonnes of edible grade protein available at low prices. The plan will boost investment in technology and inputs to raise the oilseeds productivity. The need for edible oil processing industry to modernise its operations has been stressed.

(Chemical Products Finder 8(11), 1990, 169)

## 35 Hexane shortage pushes up bran oil price

The solvent extraction industry is concerned at a shortage of hexane (food grade), which is used as a solvent. Reports indicate that several solvent extraction units in Punjab downed their shutters for want of hexane after commencing work in the wake of market arrivals of the new paddy crop. As a result, rice bran oil prices have shown a contra-seasonal rise.

A strike by sheller mills in Uttar Pradesh over the State Government's levy policy has strengthened the market sentiment, according to trade sources. As many solvent extraction units are unable to operate to their full capacity because of scarcity of hexane offerings of soyabean and other oils have been reduced, causing their prices to look up.

(The Oils and Oilseeds Journal 42(4-6), 1989, 47)

## 36 Oil store limit for vanaspati units reduced

The Government has decided to reduce the stock limit of edible oils in vanaspati with the producers from the existing level of one twelfth of the annual capacity to one twenty-fourth of the annual capacity.

It was also been decided to reduce the stock limit of oilseeds by restoring the limit to the level prevalent in early March 1990.

The higher stock limit for mustard seeds which was three times of the other oilseeds has now been revoked. The order will come into force with effect from July 2.

These measures are likely to result in releasing additional oil, vanaspati as well as oilseeds into the market, thereby, easing the pressure on prices, according to an official release.  
(Financial Express 26 June 1990, 1)

## 237 Maharashtra gur traders down shutters

More than one thousand gur traders all over Maharashtra have downed their shutters for three days since yesterday, in protest against the proposals of the state government to impose two per cent sales tax on gur, UNI reports.

Mr. Deepak Shah, convener of the action committee for abolition of sales tax on gur, told reporters here today that the state government would lose about Rs. 10 crores during the three days and traders from all over Maharashtra would also lose business around Rs. five crores per day.



## 238 Solvent extraction processing of oilcakes and rice bran

		1988-89		1987-88	
Sr. No.	Commodity oilseeds/ oilcakes/ rice bran	Production			Extraction (M.T.)
		Quantity processed (M.T.) (estimated)	S.E. oil (M.T.)	Quantity processed in (M.T.) (estimated)	S.E. oil (M.T.)
1.	Rice bran	23,00,000	3,45,000	21,30,000	3,20,000
2.	Groundnut cake	10,00,000	70,000	3,00,000	21,000
3.	Cottonseed cake	1,00,000	6,000	1,00,000	6,000
4.	Soyabean	10,50,000	1,88,000	7,00,000	1,26,000
5.	Mustard/ rapeseed cake	3,75,000	30,000	2,65,000	26,000
6.	Sunflower seed cake	2,25,000	27,000	2,00,000	25,000
7.	Sesameseed cake	50,000	4,000	-	-
8.	Salseed	55,000	6,500	1,05,000	13,000
9.	Safflower oilcake	25,000	1,700	35,000	2,500
10.	Linseed oilcake	-	-	1,100	80
11.	Other newer oils & tree origin oilseeds	2,30,000	25,000	1,60,000	15,000
Total		54,10,000	7,03,200	39,96,100	5,54,580
			45,95,000		1,41,000
					33,75,000

(Poultry Guide 27(3), 1990, 107)

## 239 Profit on soft drinks

Trading in soft drinks has turned out to be a rewarding business activity for Usha Rectifier Corporation. The company sold 365,145 crates of soft drinks during 1989 and realised sales income of Rs. 111.81 lakhs. The unit value of sales works out at Rs. 0.31 lakh per thousand crates.

What was the unit value of purchases for the company? It purchased 368,300 crates at a value of Rs. 88.92 lakhs. The unit value works out at Rs. 0.24 lakh per thousand crates. The trading profit in soft drinks sales works out at Rs. 22.89 lakhs.

The profit before tax of the company during the year has been Rs. 1265 lakhs. That means around two per cent of the profits has come from purchase and sale of soft drinks for this electrical goods sheets manufacturing company. Another moot point is that arithmetic of stocks of soft drinks in the annual report is rather puzzling.

Incidentally income from sale of soft drinks has more than doubled during 1989 over the previous year - from Rs. 46.58 lakhs to Rs. 111.81 lakhs.

(The Economic Times 9 July 1990, 7)

## 240 Spices unit in Kerala

The Regional Research Laboratory (RRL) here has submitted a project report to the state horticultural development corporation on setting up a spices processing unit based on the know-how developed by RRL, reports PTI.

Disclosing this at a press conference here, the RRL director, Dr. A. D. Damodaran, said the proposal was under the active consideration of the state agriculture ministry which wanted it to be included in the European Economic Community (EEC) assisted package of programmes.

The idea was to market processed spices, instead of raw spices, with the aim of fetching better profits to government and commensurate returns to farmers.

The RRL, Dr. Damodaran said had developed a technology to process raw pepper into white pepper, which would command better prices in the world market.

He also disclosed that a demonstration plant, based on technology developed at the RRL for processing coconut milk, was to be set up at Kochi shortly.

(The Economic Times 10 June 1990, 6)



## 241 No ST on papads

The Tamil Nadu government on Monday announced that papads would be totally exempted from sales-tax. This was announced in an official press release here.  
(The Economic Times 31 May 1990, 10)

## 242 Milk utilisation pattern in India

(Percentage)

Particulars	1984-85	1985-86
Liquid milk	46.0	46.0
Milk powder*	3.0	3.6
Ghee	28.0	28.0
Butter	6.5	6.5
Khoa	5.5	5.5
Cream	0.5	0.5
Curd	7.0	7.0
Ice-cream	0.7	0.7
Cheese**	2.0	2.0
Others	0.8	0.2

\* Includes infant milk food

\*\* Includes cottage and processed cheese

(Khadi Gramodyog March 1990, 276)

## 243 Rice mills in India

Year	Hullers	Shellers	Hullers cum Sheller	Modern/ Modernized Mills	Total
1978	70,305	3,257	8,203	3,207	84,972
1983	79,799	5,841	9,034	12,647	107,321
1988	84,485	4,678	9,845	26,753	123,671

Source: Rice Milling Cell, Government of India  
(SEA News Circular June 1990, 21)

## 244 UK firms offer expertise in food processing

The food processing industry of the UK has offered to assist Indian companies in technologies, equipment and services since they find a great potential in India for food processing industry. Dr. Ronald Watkins, Chairman, High Value Horticulture (HVH) PLC was in

India for three decades, first for ICI and then for Richardson Hindustan. HVH has been approached by Sikkim, Arunachal Pradesh and Meghalaya for assistance in formulating horticulture development plans, according to Dr Watkins. He is hopeful of finalising one or two joint venture agreements with Indian companies. A British food processing trade mission was in India in October last year, of which Dr. Watkins was a member. The mission identified areas in which the UK companies can play a meaningful role.  
(Industrial Products Finder 18(7), 1990, 115)

## 245 Food testing lab set up

The Federation of Indian Chambers of Commerce and Industry (FICCI) and its specialised wing for food industry, Confederation of Indian Food Trade and Industry (CIFTI) have set up a food testing laboratory at New Delhi to provide facilities to food processors and traders for analysing all types of food articles. These include edible oils and fats, milk and milk products, food grains and cereal products.

The FICCI-CIFTI laboratory set up with the assistance of Industrial Development Bank of India (IDBI) is having state of art technology for testing food articles to check the presence of contaminants, mycotoxins and the like in the food articles. The import and export units engaged in food trade can also get their food articles analysed to ensure that their products conform to the quality prescribed by the statutory agencies and importing countries. The laboratory will provide facilities for analysis as per the standard prescribed under Prevention of Food Adulteration Act (PFA) rules and Bureau of Indian Standards.

According to a release, the new laboratory will be accessible to the food processors and traders. They can get the testing and analysis done within a short span of time at a very nominal cost.

Besides this would help in building up quality consciousness in the food processing industry since most of the medium, small and cottage industries are not fully aware of the importance of adequate quality control and do not have the resources to invest in quality control systems.

Another function of the FICCI-CIFTI laboratory will be to help industry by providing technical knowhow for improving the quality and to ensure longer shelf life to the products.  
(Chemical Weekly 25(43), 1990, 68)



## Food Regulation, Quality Control & Hygiene

- 246 A new yellow colorant for food contact plastics approved in USA.

A new yellow colorant for plastics developed by Ampacet Corp. (USA) has been recently approved by FDA in USA for food contact plastics. According to the company, the new colorant exhibits the same opacity and colour values as lead chromate colorants, which do not have FDA approval for food contact. The new yellow colorant has been developed for the blown and cast film industries.  
(Chemical Weekly 35(34 , 1990, 99)

- 247 Spices Board Act to be amended

The Spices Board Act will be amended to enlarge the scope of the activities of the board. Mr. K.N.Ardhanareeswaran, special secretary in the Union Commerce ministry, said on Sunday, reports PTI.

The amendment would be introduced in the next session of the parliament, he said while inaugurating a quality evaluation and upgradation laboratory of the Spices Board here.

Mr.Ardhanareeswaran said the Board's activities which was now confined mainly to the development of cardamom and pepper, should also be extended to other minor spices.

The Board should introduce new spices crops and function as a "clearing house" for these products by providing all help to farmers, processors and exporters, he said.

The concept of 'inspection' should change and the export inspection agency should function as an export facilitation agency, providing all necessary backups to the exporters, he said. The Spices Board should also function as a communicator between the foreign buyers and Indian exporters.

The Spices Board chairman, Mr.K.M.Chandrasekhar, in his address said the cardinal function of the quality evaluation laboratory would be to test quality of spices to be exported under the logo of the Spices Board.

(The Economic Times 26 June 1990, 3)

## 248 BVOs not carcinogenic

Parle (Exports), manufacturers of Limca and Gold Spot, has said that Brominated Vegetable Oils (BVOs), banned by the government on April 15, is not carcinogenic and is allowed in the US. In a press statement issued on May 20th, at New Delhi, the company quoted the Food and Drugs Directorate, US, stating that no evidence existed that the consumption of beverages containing BVOs had produced harmful effects in humans.

However, the director of the department of prevention of food adulteration, Mr. P.N. Gupta, said the use of BVO in America is allowed only upto a concentration of 15 ppm. Parle has not specified the concentration BVOs in its old stock. Parle has asserted that BVOs is not carcinogenic but the company is silent on other harmful effects of the banned product.

The Monopolies and Restrictive Trade Practices Commission, in its investigation of the soft drinks case, noted that studies in the US had shown that the use of BVOs even in the concentration of 0.5 per cent causes growth retardation, impaired food assimilation, slight amnesia and enlargement of the heart. Parle has said that old products are not in the market. The press statement also gives reasons why Limca and Gold Spot were not withdrawn when the ban notification was issued.  
(Chemical Weekly 35(38), 1990, 68)

## 249 New and revised Indian Food Standards

- 
- |    |                         |   |
|----|-------------------------|---|
| 1) | IS 3839 : 1989          | Food Yeast - Specification<br>(first revision). Gr.4  |
| 2) | IS 5969 (Part 10): 1988 | Meat and meat products - Methods<br>of test: Part 10 Measurement<br>of pH. Gr.3                                     |
| 3) | IS 5969 (Part 11): 1988 | Meat and meat products - Methods<br>of test: Part 11 Determination<br>of glucono - delta - lactone<br>content Gr.3. |
| 4) | IS 5960 (Part 12) 1988: | Meat and meat products - Methods<br>of test: Part 12 Determination<br>of L-(+) - glutamic acid<br>content. Gr.3     |
| 5) | IS 5960 (Part 13) 1988: | Meat and meat products - Methods<br>of test: Part 13 Determination<br>of polyphosphates. Gr.3                       |



- |     |                         |   |
|-----|-------------------------|---|
| 6)  | IS 5960 (Part 14): 1988 | Methods of test for meat and meat products: Part 14 Determination of starch content. Gr.4.  |
| 7)  | IS 12516 (Part 4): 1988 | Method for Determination of physical characteristics of doughs made from wheat flour: Part 4 Rheological properties using an alveograph. Gr.5 |
| 8)  | IS 12541: 1988          | Meat and meat products - Poultry - chicken curry, canned - specification. Gr.2  |
| 9)  | IS 12542 : 1988         | Meat and meat products - Canned ham, minced - specification. Gr.2   |
| 10) | IS 12616: 1989          | Pesticide residues in foods - Cypermethrin, deltamethrin, fenvalerate and permethrin - Method for determination, Gr.2.                        |

---

(Standards India February, March, April 1990)

## 250 Use of mustard oil in vanaspati disallowed

The Government has decided to discontinue the permission for use of mustard oil (expeller) in vanaspati with immediate effect, it was officially stated today.

This is in view of the increase in prices of mustard oil in the market. The use of mustard oil (expeller) to the extent of 20 per cent in vanaspati was permitted by the Government since March 14 this year.

(The Hindu 7 July 1990, 10)

## 251 Dried banana powder: An anti-NUD agent

Dried banana powder might turn out to be a useful agent in the treatment of nonulcer dyspepsia (NUD), according to researchers at the All India Institute of Medical Sciences, New Delhi.

A study conducted by AIIMS researchers shows that dried banana powder is a safe and effective treatment for NUD, a condition marked by chronic abdominal pain, nausea and cramps.

The fact that banana powder is cheap, easily available and is a part of traditional Indian food prompted the researchers to investigate its properties as an anti NUD agent.



The preliminary AIIMS investigation involved 46 patients with NUD in a prospective, randomised controlled trial.

The symptoms were partly or completely relieved trial within eight weeks in 75 per cent of those undergoing the treatment but only 20 per cent of the controls.

(P.T.I. Science Service 9(8), 1990, 4)

## 52 Overcooked meat may cause cancer

Researchers in South Australia have established a link between overcooked meat and the presence of carcinogenic chemicals in the human body.

A team at the Flinders Medical Centre, Adelaide has found that 12 chemicals in a group known as aromatic amines were formed by chemical reactions in meat and fish at 200 to 3000 C.

They are formed through an interaction between amino acids, creatinine and sugar, harmless compounds present in the food. These food-derived aromatic amines are among the most mutagenic compounds so far isolated. Nine of the 12 have already been shown to cause cancer in rats and mice. Work is now needed to discover what effect the chemicals would have on humans.

Since most chemicals require metabolism before being carcinogenic, it means that the level of enzymes in the body, responsible for this process, is critical if a person is going to suffer a toxic response exposure to these chemicals.

Genetic and environmental factors had been shown to change enzyme levels in the body and researchers are trying to discover if there was a link between the enzymes, food-serviced aromatic amines and human cancer.

Researchers believed that diet was underestimated as a route for exposing people to potentially toxic chemicals.

A United States survey estimated that industrial pollution contributed to only about 50% of human cancers but diet could contribute to 35%.

People who eat medium-cooked or raw meat are helping their bodies more than those who favour well-done or overcooked meat. And the best way to cook meat is in a microwave, and then discarding the juices, where most of the compounds are found.  
(Journal of Scientific and Industrial Research 49(4), 1990, 199-200)

## 253 Oily fish helps heart attack victims to live longer

A new study by researchers at the Medical Research Council's Epidemiology Unit, Cardiff, suggests that eating oily fish two or three times a week may reduce the rate of death among men recovering



from a heart attack by almost a third. Fish fingers made of mackerel rather than cod might save some Britons from a second heart attack.

In a carefully controlled trial of more than 2000 men, 94 subjects who consumed a modest amount of fatty fish over two years died compared with 130 who followed different diets. According to the researchers this net difference of 29% was very unlikely to have happened by chance.

Although earlier studies have shown that people who choose to eat fatty fish several times a week tend to have a lower risk of dying from heart disease, this is the first investigation to show that such a modest change in diet may help prolong the lives of people who have already had a heart attack.

The focus was on three types of dietary advice, and different groups of men recovering from a heart attack were told to do one or more of the following: eat less fat, especially saturated fat; or eat at least two weekly portions of between 200 and 400 g of fatty fish (mackerel, herring, kipper, pilchard, sardine, salmon or trout). Most of the fish that Britons eat is white fish, such as cod, plaice and haddock. These contain much less of the beneficial fish oils.

The eight groups were given different combinations of this dietary advice; one group received no dietary advice. Subjects who disliked the fish prescribed in their diet took three capsules of fish oil a day.

According to researchers, the men who were advised to eat fish were less likely to die of a heart attack in the two years of the study. Yet diets low in fat may still benefit people who have had heart attacks, even though benefit showed up in this study. One problem was that many men outside the low-fat group nonetheless spontaneously reduced their intake of saturated fat, blurring the distinctions between the groups. And the men advised to reduce fat found it difficult to stick to the diet.

It is speculated that the benefits of reducing the intake of fat, and so lowering levels of cholesterol in the blood, may take more than two years to affect death rates. Fish oils probably produce a more immediate benefit, lowering the risk of a fatal heart attack. Fatty fish contains high levels of eicosapentaenoic acid (EPA) which the body metabolises in complex pathways to produce various substances, notably prostaglandins.

EPA in the diet enhances the levels of prostaglandins that reduce the tendency of the blood to clot. This may also prevent fibrillation - the uncontrolled contraction of the heart muscle during brief periods when it is starved of oxygen. This could explain why eating fatty fish lowered the risk of death, but not the risk of having another heart attack.  
(New Scientist No. 1685, 1989, 25)



## 254 Caffeine and automobile driving

Thirty minutes after ingesting 200 milligrams of caffeine or a placebo, each of 24 male subjects drove an automobile simulator for 90 minutes. Immediately thereafter, the subject ingested again either 200 mg of caffeine or a placebo, and then drove for another 90 minutes. The simulator provided a comprehensive and coherent set of stimulus inputs which produced a degree of realism not usually found in laboratory studies. Both the initial and the supplemental doses of caffeine significantly enhanced performance beyond that found with placebo, on each of four measures of alertness.  
(Indian Coffee 54(6), 1990, 20)

## 255 "Methi" cure

Seeds of fenugreek (methi) taken daily will not only control diabetes but also reduce cholesterol. Studies at the National Institute of Nutrition in Hyderabad show fenugreek is effective even in type-one diabetics who depend on insulin. Fenugreek seeds markedly lower the glucose level in blood and by as much as 64% in urine. The results are noticeable in 10 days.  
(Deccan Herald 17 July 1990, 13)

## 256 Nickel content in vanaspati high

Scientists of the Environmental research laboratory here have found that there is very high concentration of nickel in four leading brands of hydrogenated vegetable oil (vanaspati) in the country.

Giving details about the laboratory's 'Citizen's action programme', under which the research was carried out, the executive director of the research laboratory, Dr. M.C.Saxena, said higher incidence of cardiac arrests, cancer and vulnerability to other common diseases, may be attributed to polluted ecology and severe food contamination.

Dr.Saxena, said vegetable oil constituted an integral part of food for it was used as the sole cooking medium.

Assuming that an average person consumed 40 grams of vegetable oil every day, the total intake of nickel, through vegetable oil alone, will be approximately one mg per day per person.

Dr.Saxena said 800 million people in the country were thus unknowingly consuming a high content of toxic nickel through the hydrogenated vegetable oil without realising the toxic potential of the element.

Nickel is one of the most toxic metals after lead and mercury known to accumulate in the atmosphere and poses a health hazard to humans.

(The Times of India 2 July 1990, 6)



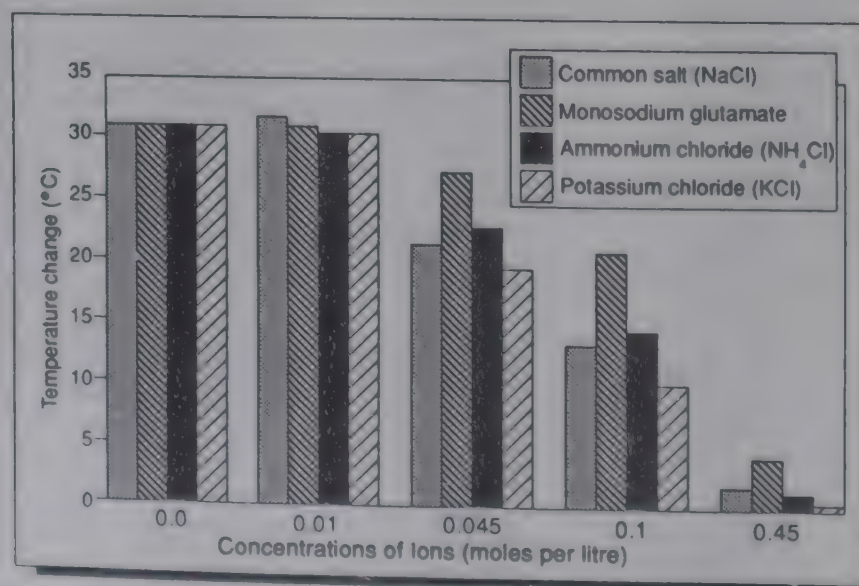
## 257 Salty food and microwaves

Microwaves cannot easily penetrate salty food, according to microbiologists from the University of Leeds. Their finding could help to explain why outbreaks of food poisoning, caused by the listeria and salmonella bacteria, have increased recently. It may simply be that the interior of salty packaged foods that are cooked or reheated in microwave ovens are not reaching high enough temperatures to kill such organisms. The salt contains ions which can be made to flow by the electric field in microwave radiation, sapping its energy near the surface of food.

Stepen Dealler and Richard Lacey were carrying out tests to find how effectively microwave ovens destroy salmonella and listeria in food. They added the bacteria to 10 different pre-cooked dinners, then heated them according to the manufacturer's instructions. The ovens they used - 10 different makes - all met the safety standards set by the British government last year.

Dealler and Lacy heated the food for the time specified on the packets. But they found that roughly half of the bacteria survived. This contradicted the results obtained by government scientists. The two Leeds researchers noted that the government trials had been carried out on samples of unsalted mashed potato. The food they themselves had tested, on the other hand, contained salt.

The researchers decided to investigate how the concentration of various salts in food affects the effectiveness of microwave heating. First, they measured the concentration of ions in unsalted mashed potato at 8 C. Then they added several salts - ordinary table salt, ammonium chloride, potassium chloride and monosodium glutamate - in various concentrations to various samples. Finally, the researchers heated each sample for one minute in a common domestic microwave.



*Cool at the core: As the concentration of ions in mashed potato is increased, the interior receives less heat. In each case, a 200-gram sample was heated for one minute in a 650-watt microwave oven*



Immediately after heating, Dealler and Lacey measured the "core" temperature of the mashed potato. They found that the samples with the greatest concentration of ions had the coldest interiors (see Figure).

Dealler and Lacey believe that their results can be explained if microwaves induce currents in the surface of food with high concentrations of ions. The currents sap energy from the microwaves before they can penetrate the food to heat the core. This mechanism may also explain, they say, why food heated in microwave ovens commonly boils on the surface but is cool on the inside. "The induction of ionic currents by electro-magnetic radiation is not yet a recognised phenomenon, as far as we know", say the researchers. Manufacturers of pre-cooked foods have to use salt to preserve and flavour of food. (New Scientist No. 1713, 1990, 28)

## 258 Gene probes may help to spot listeria in food

The foods we buy could soon be free of the bacteria that cause listeriosis, a disease that can trigger miscarriages and kill people with weakened immune systems. A two-year programme, led by Ray McKee of the Institute of Food Science in Norfolk in Britain, aims to develop a DNA-based test that identifies the bacterial culprit, *Listeria monocytogenes*, in minutes.

The Public Health Laboratory Service in Britain has identified *L. monocytogenes* in a number of foods, mainly soft cheeses, pate and cook-chill meals. Unusually, the organism survives at temperature down to 1 °C, which means it can continue to grow in food even when stored in refrigerators. Also, the government's Committee on the Microbiological Safety of Food says that, at any one time, the organism is detectable in the digestive tracts of one in 20 of us.

The existing test for *L. monocytogenes* takes up to 10 days to yield results because analysts have to wait to see whether the bacteria grows on a suspect sample cultured in the laboratory.

A spokeswoman for the IFS said that McKee's team aims to base a detection system on "gene probes", synthetic strands of bases that bind uniquely to specific strands of DNA in a target organism. By tagging the probes with a marker, such as an atom that discharges detectable levels of radiation or light, analysts can tell almost immediately whether the target organism is present in a treated sample.

McKee and colleagues are to design the probes mainly for use in the food industry so that processors can trace signs of contamination anywhere in the production line, then identify the source.

Industry and government are funding the project jointly under the Link initiative, which promotes collaborative research between the public and private sectors. The Ministry of Agriculture, Fisheries and Food and the Department of Trade and Industry will between them pay £ 145 000. Unilever Research and Marks and Spencer will pay the same amount.

(New Scientist 9 June 1990, 39)



## 259 Vegetables fight cancer

Those who eat more cabbage, broccoli, Brussels sprouts, cauliflower, garlic, onions, scallions and leeks have a lower incidence of cancer than those who eat smaller amounts of these foods, according to an article in the journal of the national cancer institute, reports PTI from Washington.

Two scientists from the institute for hormone research in New York, Dr. Leoubradlow and Dr. Jon Michnovicz, said they found that vegetables such as cabbage and broccoli contained a chemical known as Indole-3-carbinol which reduced breast cancer risk by speeding up a particular process by which body metabolised the female hormone estrogen.

(The Times of India 13 June 1990, 11)

## 260 Ghee safe for heart patients

Longer considered to be harmful for the heart, according to the vice-chairman of the Heart Care Foundation of India, Dr K.K. Aggarwal.

Exploding the popular myth about the cooking medium at the first heart check up camp, at Khurja, near Delhi yesterday, Dr. Aggarwal stated that ghee does not produce free radicals in the body which cause atherosclerosis or narrowing of the arteries due to the deposition of fat, leading to heart attacks and strokes. On the other hand, it raises the body's resistance and its own enzymes act as a scavenger in the body, according to him.

Dr. Aggarwal advocated the use of ghee for all those who did not have a high cholesterol level in the blood. It was the use of artificial fertilisers, weed killers and insecticides which were the major factors in the causation of atherosclerosis and heart diseases.

(The Times of India 8 May 1990, 5)

## 261 Fried chicken

American poultry can now be exposed to gamma radiation to kill organisms that cause disease. The US Food and Drug Administration approved the process last week, marking the first time that the government has approved the irradiation of solid food.

Manufacturers may administer up to 3 kilograys of ionising radiation to the poultry. Such irradiation kills most of the bacteria in the food, but the poultry must still be refrigerated to prevent the remaining microbes from multiplying. The agency emphasised that the process does not make food radioactive.



Irradiation will extend the shelf-life of poultry and decrease the incidence of food poisoning in the US, according to FDA officials. Poultry contaminated by the bacteria *Salmonella*, *Yersinia*, *Campylobacter* and other microbes causes 10 per cent of all food-borne illnesses present in the US, according to the FDA.  
(New Scientist No. 1716, 1990, 31)

## 262 Synthetic food for diabetics

A Japanese company, Terumo Kabushiki Kaisha, has filed a European Patent (No. 323,510) on a synthetic food which it claims can prevent overeating and help diabetics to control the level of glucose in their blood.

Mechanical extension of the stomach inhibits appetite. Medical methods of extending the stomach wall, for instance by inflating a balloon in the stomach or stapling the walls require surgery and may have unpleasant side effects. Their answer is to provide a foodstuff that stays in the stomach for a long time and fills the space.

This is normally difficult because acidic juices in the stomach reduce the viscosity of food. The new material is a mix of water-soluble fibre, such as carrageen or guar gum, with protein, such as sodium or calcium caseinate. This mixture forms a gel in the stomach which absorbs water and some of the sugar in food and drink eaten subsequently. The sugar is thus prevented from passing through the stomach wall and into the blood and the gel stops the patient from feeling hungry.

The company claims that glucose levels in the blood of diabetics were lower when they ate the gel before dining.  
(Chemical Weekly 35(34), 1990, 99-100)

## 263 HPLC and egg cholesterol level

Eggs are generally assumed to be high in cholesterol and people at risk to heart attack are warned to be cautious in their intake. However, researchers recently have shown that the data should be re-evaluated. Current data were obtained by colorimetric determinations and are too high by a factor of 30%. Using high performance liquid chromatography (HPLC), the researchers found 10.97 mg. of cholesterol per gm. of wet yolk compared with figure of 13.86 mg. obtained by a calorimetric method of saponified egg yolk.  
(Chemical Weekly 35(34), 1990, 97)

## 264 A non-polluting cleaning process

A new chemical cleaning method removes contaminants from high-purity process systems in the pharmaceutical, biotech, food and beverage and other industries in a more environmentally safe manner than existing methods reports Cal-Chem Corp. of South El Monte California.



The method called SCRP (for specific chelation, reduction and passivation), can be used to clean piping, tubing, tanks, vessels, valves and fittings in systems that transport water, air, steam, nitrogen, oxygen and other materials.

Current cleaning standards set by ASTM and the American Society of Mechanical Engineers specify the use of mineral acids for such applications. However, mineral acids extract toxic heavy metals that can contaminate high-purity systems and are difficult to dispose off. The SCRP process uses non-toxic organic acids (such as citric acid) and chelants that do not extract heavy metals, making it possible to dispose of solutions in sanitary sewer systems.

Cal-Chem is now seeking to revise ASTM and ASME cleaning standards to incorporate its system as an alternative to use of mineral acids.

(Chemical Weekly 35(32), 1990, 91-92).

### Transfer of Technology & New Industries

#### 265 Lever, MPEDA Tie-up for shrimp farming

The Marine Products Export Development Authority (MPEDA) has entered into a tie-up with Hindustan Lever Ltd (HLL) for shrimp farming. HLL has achieved a technological breakthrough at its Sandeshekeli aquaculture farm in the Sunderbans in West Bengal. HLL has expressed its willingness to transfer the technology free of cost. The deal has the support of the Department of Biotechnology.

In order to help individual entrepreneurs in such ventures, MPEDA is negotiating with the National Bank for Agriculture and Rural Development (NABARD) and financial institutions for fund support. During the current year, MPEDA has invested in the equity of eight companies engaged in either processing marine products or exports. In 1990-91, MPEDA has sought a doubling of its previous year's allocation of Rs.25 lakhs.

(Chemical Products Finder 8(12), 1990, 136)

## The BVO Story

C. L. Nagarsekar

The Indian soft drink industry which has a turnover of over Rs. 700 crores in the organized sector, and a similar quantum in the unorganised sector was left high and dry at the peak of this summer season. With effect from April 16, 1990, Government of India imposed a ban on the use of brominated vegetable oils (BVO), widely employed as an emulsifying agent in citrus flavoured soft drinks and synthetic beverage powders. Goldspot, Limca, Campa Orange, Duke's Lemonade, Rush, Tingler, Tripp were some of the leading soft drink brands suspected to be using BVO, along with Rasna and others. The industry was not fully equipped with a substitute for BVO although BVO has been a controversial ingredient at the International level for over 20 years.

BVO is an emulsifier used all over the world for the

past 3 decades. It is a brominated vegetable oil (olive oil, cottonseed oil, corn oil, safflower oil, sesame oil, etc.) wherein bromine is added across some of its double bonds. BVO is used in the formulation of carbonated and noncarbonated citrus flavoured beverages to adjust the density of flavour emulsions and to prevent the separation and deposition of these flavouring ingredients as a ring in the neck of the bottle. BVO modifies the specific gravity of the flavoured oil which is usually lighter than that of water. Thus, a stable emulsion cloud is formed when BVO is added and it gives the beverage desired body, cloudiness as well as a vehicle for the flavour dispersion.

It was in late 1960s that BVO came under a cloud when World Health Organization (WHO) expressed the

### ***Excerpt from the letter written by Dr. J. C. Munro to Director General of Health Services, India:***

*"I am writing to the expert group of the Central Committee for Food Standards to provide additional independent information on the safety of brominated vegetable oil (BVO). I am writing at the request of Dr. Nancy Higley, Chairperson of Beverage Emulsion Stabilizer Committee of the International Life Sciences Institute. Dr. Higley presented information at the October 6, 1989 meeting of the expert group supporting the use of BVO at 15 ppm. She feels that the additional information I will present below could help the expert group in its deliberations.*

*I am currently Director of the Canadian Centre for Toxicology in Guelph, Ontario, Canada, a position I have held for the past four years. Prior to that, I was employed for approximately 20 years by the Federal Department of Health and Welfare of Canada where I held various positions including Director General of Food Directorate. In this position, I was responsible for the safety of all the foods sold in Canada. I have also served for many years on the FAO/WHO Joint Expert Committee in Food Additives as an expert on food toxicology.*

*My interest in the safety of BVO goes back many years, indeed it was through the work I did while in the laboratory that the toxicity associated with BVO first came to light. On the basis of my investigations the Canadian Government, along with the Government of many other countries, took action in early 1970s to set the use of BVO at the currently acceptable level of 15 ppm.*

*The basis of 15 ppm arose as a result of studies we conducted on laboratory animals which clearly demonstrated that below a daily dose of 50 mg/kg of BVO no toxic effects were seen. The acceptable daily intake for humans was established at 1/100 (one hundredth) of that dose 0.05 mg BVO/kg body weight/day.*



fear that the consumption of BVO could be problematic. Extensive studies were carried out on BVO at the Food and Drug Directorate of Canada by a team of several workers led by Dr. J. C. Munro. Their published work indicated that rats fed the diet containing 0.5 to 2.5% of BVO for 80 days developed degenerative myocardial lesions, alterations in lipid profiles of liver, thyroid microfollicular hyperplasia, and renal proximal tubular degeneration. The myocarditis associated with BVO feeding was characterised by edema, fatty changes and myocytolysis with subsequent progression to necrosis.

The level of BVO in these experimental diets was quite high and the subsequent experiments by the team indicated that similar effects were noted in the heart and kidney of rats fed 0.5% but not 0.1% or 0.02% of BVO in the diet for 120 days. Fatty infiltration of the liver was observed at 0.5% and 0.1% levels but not in those fed at 0.02% level.

Further animal studies conducted at the Children's Hospital Research Foundation, Cincinnati, USA, indicated behavioral birth defects because of consumption of high doses of BVO. Toxicological investigations further indi-

cated that BVO being a lipid may accumulate at low levels in the tissues of both animals and humans, exposed to the substance. However, research for over past 2 decades has not conclusively proved that BVO is carcinogenic. Based on these studies, Dr. J. C. Munro himself wrote on Nov. 23, 1989 to the Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India recommending that the use of BVO at levels below 15 ppm could be allowed [see box].

As of today, 129 countries have banned BVO primarily because of WHO alert. In U.K. and some Gulf countries, it was banned more than 10 years ago. USA, Canada, Belgium, Sweden and Netherlands have permitted the use of BVO within 15 ppm. The USA, which entered this ban fray only last year uses Estergum at 100 ppm maximum along with 15 ppm BVO; while in Canada BVO is used in combination with Sucrose Acetate Isobutyrate (SAIB).

The banning of BVO in India is a long story. In pursuance of WHO alert, the Food Technology and Science Subcommittee, in 1970, recommended phasing out the use of BVO as food additive. This was readily accepted

*The factor of 100 used in extrapolating the laboratory data to humans provides a wide margin of safety insofar as human exposure is concerned and moreover is accepted internationally as an appropriate method of ensuring no harm could come to humans consuming products containing BVO. In order to ensure that the acceptable daily intake of 0.5 mg/kg/day was not exceeded, an upper limit of 15 ppm of BVO used in soft drinks was established.*

*Between 1970 and the present, several further studies have been conducted on BVO including metabolism studies and additional toxicological investigations. It is now well established that BVO or its metabolites may accumulate, at low levels in the tissues of animals or humans exposed to the substance. This is not surprising because, it is handled in the body much like any other source of dietary fat. However, in chronic animal studies in which animals were exposed to dietary levels several orders of magnitude in excess of any possible human exposure, the tissue accumulation of BVO did not produce any adverse effects either in terms of chronic toxicity or generic changes. Thus, in my view, the minimal accumulation one might expect to find in humans consuming BVO-containing foods, is of no toxicological consequence. This view is endorsed by the Canadian Government and the Food and Drug Administration (FDA) of United States, both of which continue to permit the use of BVO in accordance with the 15 ppm limit. I might add that BVO is used at the 15 ppm limit in many other countries as well. At the present time, there is no indication that any further restrictive action is necessary.*

*As you know, BVO is of considerable technological benefit in maintaining proper suspension of flavouring and colouring ingredients in beverages. There is, at present, no entirely acceptable alternative substance for this use. In Canada, BVO is used in combination with sucrose acetate isobutyrate which is also permitted for this purpose. The combination of these agents is essential to ensure proper product formulation and consumer acceptability of soft drink products."*



y the National Health and Medical Research Council but no follow up action was taken. In 1974, the Food Additives Subcommittee expressed concern over the non-implementation of the phasing out of BVO and recommended to the Food Standards Subcommittee a ban on BVO from January 1, 1975. As there was no suitable substitute available the issue lingered on. In 1979, the Subcommittee ultimately forced the Government to issue a notification seeking public opinion on the ban, but the Prevention of Food Adulteration Act was never amended to actually ban the additive. Once again on 15th April 1988, the Government issued a notification banning BVO as an emulsifying and stabilizing agent, but the representatives of beverage industries pleaded for an alternate substitute for BVO which was not readily available—and the ban was kept in abeyance for 2 years. Finally, in mid 1989, the Consumer Unit and Trust Society (CUTS) of Calcutta, filed a case against the Government of India for its failure to implement the ban imposed on 15.4.1988. Justice V.B. Eradi of the National Consumer Disputes and Redressal Commission, Delhi, issued an order on September 13, 1989, calling upon the Government to fulfill its commitments within 3 months.

But for this order, the decision of the Government could have been still prolonged. That the Government is not yet convinced is obvious from the sworn affidavit filed by its officials in court admitting that the BVO studies were not complete and the WHO studies remain inconclusive as yet.

The statistical data on the Indian soft drink and beverage industry for 1988 shows the following:

1. Aerated soft drink production—2370 million bottles of 200 ml each, worth Rs. 710 crores. Major market share (44%)—Parle Beverages & Export. (Lemon and orange flavoured drinks—56% of total; cola based beverages—35% of total.)
2. Fruit based RTS beverage production—270 million bottles and packs worth Rs. 80 crores. Major market share (68%)—Parle's Maaza, Frooti
3. Soft drink concentrate powders—Production—Rs. 32 crores. Major market share (60%)—Rasna of Pioma Industries Ltd.

The Indian beverage industry need BVO at a level of 40-60 ppm in citrus flavoured beverages. The ban caught some industries napping as they had no alternate substitute for BVO readily available that could provide the required product standards. The consumer activists were very eager to get assured that no beverage containing BVO reaches the consumer from 16.4.90 onwards.

Parle Exports introduced a locally developed sub-

stitute based on esters of mono and di-glycerides about 2 months prior to the ban. However, the colour, appearance and cloudiness of their product suffered marginally. Newer substitutes are being developed and used. They are within the ambit of PFA rules. However, the manufacturers and the end users are reluctant to declare their compositions. A number of substitutes are already being used by various soft drink manufacturers as MRTP Commission had come down with a heavy hand on the defaulters even banning a few leading soft drink brands.

The complexity of the whole issue is that while BVO is being labelled as toxic and carcinogenic by the consumer activists, the soft drink industry thinks that the ban is a debatable issue. Since (i) BVO is in use for the last 30 years without any apparent or observed hazard to humans. After exhaustive research it is permitted in developed countries like USA and Canada at a level of 15 ppm, which ensures enough safety margin. (ii) At the safe level of 0.5 mg/kg/day for a normal person of 65 kg body weight consumption of 32.5 mg BVO in a day is harmless. A drink bottle of 200 ml, would contain 3 mg BVO at 15 ppm level. Hence one can consume 11 bottles of soft drinks containing BVO daily which is much beyond the normal consumption limits. (iii) All the halogen compounds used in food industry are under a cloud and there is a move to ban not only bromine containing compounds but even fluorine in tooth paste. Even normal chlorination of drinking water leads to the formation of chloroform at a level of 80 ppb and chloroform is a known carcinogen. Indian water receives higher doses of chlorine, particularly in monsoons. Similarly iodization of salt may require reconsiderations as the effect of consumption of halogen through water and salt is not yet fully studied. (iv) Consumers are eager to know about BVO however they are confused as misinformation is floated in local press condemning all soft drinks, whether they contain BVO or not. Technically, BVO was used in citrus flavoured soft drinks and not in other beverages such as cola based ones. (v) The processed food industry in India in the organised sector has a production out put much lower than the corresponding figure in the unorganised sector.

The organised sector is geared to abide by the prevailing food laws and the hygiene standards—thanks to the pressure exerted by the consumer organizations and law enforcing agencies. The product quality in the unorganised sector, however, needs improvement particularly with respect to sanitary and hygienic aspects as well as use of spurious ingredients. This is evident from the soft drinks and beverages sold near schools. It is of prime importance to ensure that the banned ingredients/chemicals/colours are not used by this sector



"Directory of Indian Processed Food and Allied Industries"

Listing over 4000 major food processors/exporters and their products manufactured in the area of fruits, vegetables, cereals, dairy, fish, meat, poultry, oilseeds, nuts food additives, packaging, etc.etc.

Plus

Information on Food Laws and Regulations, financing, licensing and quality control agencies, training organizations, R&D agencies.

and

an Index of range of products, flavours and additives available in the country.

An invaluable guide to one and all in the area of food processing

Price: Rs.500/- (Packing & Forwarding charges extra Rs.25/-)

D.D./Cheque/M.O. to be drawn in favour of Director, CFTRI, Mysore. Please add Rs.10/- towards bank collection charges for outstation cheques.

For copies, write to:

The Sales and Distribution Officer, FOSTIS,  
CFTRI, Mysore - 570013.



## Index

- Alcohol export 226
- Ajra production 189
- Banana powder, anti NUD agent 251
- Beverages, cooling bag 183
- Barley production 189
- Blackgram production 190
- Bottle washing machine 174
- Brominated vegetable oil
  - carcinogenicity questioned 248
  - non-toxic substitute development 169
- Buffalo meat, minimum
  - export price 223
- Butter, low fat, mass production 168
- Caffeine and automobile
  - driving 254
- Cancer incidence and
  - vegetables 259
- Cardamon production, 199, 200
- Cashew
  - export 216
  - production 205
- Cassava storage 163
- Cassia, import duty 230
- Cation exchanger,
  - food protein analysis 186
- Chillies
  - export 213
  - production 192, 202
- Cholesterol in egg, measurement
  - by HPLC 263
- Cloves, import duty 230
- Coconut production 188
- Coffee
  - export 227
  - production 203-204
- Cooling bag for beverages,
  - fruits and meat 183
- Coriander production 192, 196
- Corn
  - enzymatic production, starch 170
- Crab meat,
  - nitrogen freezing 162
- Dehuller for soybean 180
- Diabetes and methi 255
- Diabetics, synthetic food 262
- DNA-based test for spotting
  - listeria in food 258
- Drier, cone, rotary type 173
- Driving, influence of
  - caffeine 254
- Egg cholesterol measurement
  - by HPLC 263
- Export
  - alcohol 226
  - cashew 216
  - chillies 213
  - coffee 227
  - froglegs, under
    - consideration 224
  - ginger 212
  - nigerseed under OGL 218
  - onion 214
  - pepper 209, 210
  - processed food 219-222
  - rice, new procedure 225
  - sunflower seed, new
    - procedure 225
  - sesame seed 217
  - spices 208
  - turmeric 211
- Export Facilitation Committee 228
- Export price, minimum,
  - buffalo meat 223
- Fat substitute, 'Simplease' 166
- Fish, oily, heart attack
  - reduction 253
- Food contact plastics,
  - yellow colorant, FDA approval 246
- Food grains production 189
- Food industry,
  - non-polluting cleaning process 264
  - processed food demand 207
- Food, listeria spotting, DNA
  - based test 258
- Food, processed, export 219-222
- Food, synthetic for
  - diabetics 262
- Food processing, expertise
  - offer 244
- Food processing sector,
  - economic indicator 232
- Food products, processed,
  - capacity utilization 171



-b-

- Food protein analysis, cation exchanger 186
- Food Testing Lab establishment 245
- Froglegs export, under consideration 224
- Fruit concentrate, comparative yield 172
- Fruits, cooling bag 183
- Garlic production 197
- Ghee safety for heart patients 260
- Ginger
  - export 212
  - production 192, 198
- Grain cleaner, rotary screen type 177
- Gram production 190
- Greengram production 190
- Groundnut production 191
- Gur, sales tax protest, in Maharashtra 237
- Heart attack reduction by oily fish 253
- Heart patients and safety of ghee 260
- Hexane, food grade, shortage 235
- Horsegram production 190
- HPLC, egg cholesterol measurement 263
- Huller
  - wheat, hand operated 181
  - rice, hand operated 181
- Import duty, cloves, cassia 230
- Import replenishment rate revision, marine products 229
- Indian Food Standards, new 249
- Ionising radiation, poultry 261
- Inter esterification process for vanaspathi 167
- Jowar production 189
- Khesari production 190
- Lentil production 190
- Listeria spotting, DNA based test 258
- Maharashtra, sales tax on gur, protest 237
- Maize production 189
- Marine products
  - import replenishment rate revision 229
- Meat,
  - buffalo, minimum export price 223
  - cooling bag 183
  - overcooked, harmful effect 252
  - separation, use of robot 182
- Melons sweetness test meter 187
- Methi for diabetes control 255
- Microbial destruction, salty foods, microwave cooking 257
- Microwave cooking, salty foods, and heat penetration and microbial destruction 257
- Microwave technology for pasteurization and food preservation 161
- Milk utilisation pattern 242
- Moth bean production 190
- Mustard oil, use in vanaspathi disallowed 250
- Nickel content in vanaspathi 256
- Nigerseed
  - export under OGL 218
  - production 191
- Nitrogen freezing, crab meat 162
- Non-toxic substitute, for BVO 169
- Oil expeller, double chamber 176
- Oil store limit, vanaspathi units 236
- Oil cakes
  - solvent extraction processing 238
- Oily fish
  - for heart attack reduction 253
- Oilseeds
  - development plan 234
  - production 191



- production
- spices 192
- sunflower 191
- tea 206
- tur 190
- turmeric 192, 201
- wheat 189
- uses
- production 190
- Technology Mission
- proposal 231
- radiation, ionising,
- poultry 261
- ragi production 189
- rapeseed and mustard
- production 191
- rice
- export, new procedure 225
- production 189
- rice bran
- solvent extraction
- processing 238
- rice huller, hand operated 181
- rice mills in India 243
- rice puffing machine 179
- safflower production 191
- safflower seed export,
- new procedure 225
- sales tax exemption,
- papads 241
- salty foods, microwave
- cooking, heat penetration and
- microbial destruction 257
- sealing machine, pouch 175
- Sesame seed export 217
- Sesamum production 191
- Shrimp farming, Lever and
- MPEDA tie up 265
- Small millets production 189
- 'Smart' packing 184
- Soyabean dehuller 180
- Soyabean production 191
- Soft drinks profit 239
- Spices
- export 208
- Indian, super critical
- extraction 164
- production 192
- Spices unit in Kerala 240
- Spices Board Act
- amendment 247
- Starch
- enzymatic production from
- corn 170
- Onion
- export 214
- production 193
- Packing materials, comparative
- cost 185
- Papads, sales tax
- exemption 241
- Peas production 190
- Pepper
- export 209, 210
- minimum export price 215
- production 192, 194, 195
- Pineapple,
- support price 233
- Plastics, food contact, new
- yellow colorant 246
- Potato production 193
- Pouch sealing machine 175
- Poultry ionising radiation 261
- Production
- bajra 189
- blackgram 190
- barley 189
- cardamom 199, 200
- cashew 205
- chillies 192, 202
- coconut 188
- coffee 203, 204
- coriander 192, 196
- food grains 189
- garlic 197
- ginger 192, 198
- gram 190
- greengram 190
- groundnut 191
- horsegram 190
- jowar 189
- khesari 190
- lentil 190
- maize 189
- moth bean 190
- nigerseed 191
- onion 193
- oilseeds 191
- peas 190
- pepper 192, 194, 195
- potato 193
- pulses 190
- ragi 189
- rapeseed and mustard 191
- rice 189
- safflower 191
- sesamum 191
- small millets 189
- soyabean 191



Storage, cassava 163  
Sunflower production 191  
Super critical extraction,  
spices, Indian 164  
Sweetner, new, beta amino  
acid based 165  
Sweetness test meter for  
melons 187

Tea production 206  
Technology Mission for  
Pulses 231  
Tobacco leaves, protein  
extraction 160  
Tomatoes  
grown on salty soil 159  
Tur production 190  
Turmeric  
export 211  
production 192, 201

Vacuum drum filter,  
continuous type 178  
Vanaspati  
inter-estrification  
process 167  
mustard oil use, dis-  
allowed 250  
nickel content 256  
Vanaspati units, reduction  
of oil store limit 236  
Vegetables and incidence  
of cancer 259

Wheat huller, hand operated 181  
Wheat production 189